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Original Contributions.

ON THE ETIOLOGY OF DENTAL CARIES.

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An almost universal agreement exists among the modern investigators that caries of the teeth is a chemio-parasitic process, at first due to the presence of the organic acids and later on to putrefaction, or, better stated, by the parasitic influence the organic structure is destroyed.

The first and direct cause of caries is believed to be lactic acid, a general decalcifying agent, which is formed by the fermentation of carbohydrates in the mouth.

This is impossible, for according to my observation lactic acid formation under normal conditions of the saliva cannot take place. The formation of lactic acid is only possible in the presence of grape sugar. In the mouth the transformation of the carbohydrates only reaches to maltose, the pre-lactose stage, but not grape sugar itself. That maltose actually is the end product of the changes of carbohydrates in the mouth is proven by the exact experiments of Muskulus and Mering, *Zeitschrift für Phys. Chem., Band 11.* Maltose, $C_{12}H_{22}O_{11} + H_2O$, differs from grape sugar in a different tendency to reduction reactions. The reduction tendency of malt sugar with Fehling's solution is one-third less than that of grape sugar.

Hoppe-Seylers states that normally the saliva contains a ferment capable of converting a small amount of maltose into grape sugar, and it is only after this process has taken place that lactic acid can develop by fermentation. The formation of grape sugar in the mouth is very scanty in that only a small amount of the carbohydrates is converted in the mouth and this only to maltose. The

development (?) of lactic acid by bacteria, according to the views of Miller, must be preceded by the formation of grape sugar. Cane sugar and cellulose are not transformed by the saliva, only starch and glycogen, and these only reach the maltose stage. The splitting up of the cane sugar molecule first takes place in the intestines. A solution of maltose is not affected by diastase nor saliva in several hours. (Muskulus, Mering.) If one considers the short time the foods are in contact with saliva it will readily be agreed that grape sugar cannot be formed in the mouth. It is thus seen that caries cannot be due to the action of lactic acid and the question arises as to what substance (acid) can otherwise be regarded as the cause of caries. This question kept me busy for a long time and, with considerable trouble, I finally found the secret in the acid mucin.

Every dentist knows from experience that caries is found principally in mouths where a tenacious and stringy-like saliva is noticed. How frequently do we find in mouths rich in caries a saliva that would span from lip to lip and showing a soap-bubble-like formation? In such mouths the teeth are covered with a blister-like saliva, which is recognized only after drying the seats of caries.

This peculiar mucilaginous condition of the saliva is due to mucin, a body which has not yet been observed as the explanation of caries. The great energetic acid influence which the mucin exerts on the enamel for the production of caries should receive our attention.

The mucin of the mucous secretion is the product of a mucous membrane and, as in all such membrane, so also in the oral membrane one finds numerous small glands which, according to their location, are known as labial, buccal, etc.

These glands, together with the salivary glands, furnish the fluids of the mouth, the mucilaginous consistency of the secretion being due to the presence of mucin. The parotid gland normally does not furnish mucin, but in myxedema the glandular structure is flooded with mucin and large quantities are poured into the mouth. Mucin also gains entrance to the blood circulating from the gland.

The secretions of the thyroid gland very certainly possess the faculty to split up the mucin into useful bodies, a process which possibly occurs through a ferment. If this gland be diseased there will then be formed in the body mucin areas, because of the failure

of the thyroid to functionate. In localities where goitre is endemic considerable destruction of the teeth can be observed, a similarity to that seen in myxedema and in all conditions where an increased mucin formation takes place. In some books on physiology the saliva is denominated an alkaline fluid. According to Miller the reaction of normal saliva will vary. According to Lohmann the mucin, under all conditions an acid, is dissolved in an alkaline saliva in the form of a salt. If now a transposition takes place due to the slightly acid spices the mucin is set free and acts upon the tooth substance. The continued influence of the acid mucin finally affects the inorganic material of the teeth, the enamel and dentin. Eventually, why should lactic acid induce lesions in various individuals and act so differently, causing caries in some cases and not in others, adducting that the plausibility is not indifferent?

Mucin is an acid. If saliva containing much mucin comes in contact with spices which set free the mucin, so naturally the larger amount of mucin will exert a stronger action than the smaller amount from the mucin bearing saliva. It is the same as the comparison between the action of a 1 per cent and a 5 per cent acid solution. Whether or not mucin is a definite or a variable body is as yet a question; at all events the solubility ratio, digestibleness and the elementary make-up speak of a diversity of nature which, according to the origin of each, causes its different behavior.

Maxillary Mucin, Tendon Mucin, Etc.—According to the analysis of Dr. Nerking, mucin consists of

25 per cent carbohydrate.
2 per cent fat, ether, soluble substances.
73 per cent albumin.

Mucin is insoluble in water, alcohol and ether, but soluble in weak alkaline solutions. Its acid nature can readily be determined by its action on fresh litmus paper. The analysis shows that mucin is an albuminous body, which is to be regarded a pre-stage nutritive body, and it certainly plays an important role in the nutrition of the body in general. Mucin is precipitated by acetic acid and is insoluble in an excess of the same.

On account of the tenacious peculiarity of mucin, it readily becomes attached in the confined angles, sulci and fissures of the teeth, and, thus concentrated, exerts its destructive influence on the

teeth. This explains the fact that caries always originates in the depressions and on the proximal surfaces of the teeth.

For the preparation of mucin, I desire to give a simple process. The crushed maxillary gland is macerated in cold water for twelve hours, the slimy fluid filtered and salt added to form a 1.5 per cent solution. At first the mucin precipitates, but is finally redissolved in the solution. In the maxillary gland the contained salts accomplish the dissolving action, and in order to precipitate the mucin one must immediately add water. For purification the mucin is dissolved in a 1.5 per cent salt solution and again precipitated by the addition of two or three volumes of water. The process repeated twice is usually sufficient. On an average one takes 1 gm. of the gland to 10 gm. of water. The production and purification of mucin must be accomplished in one day, because decomposition takes place early. The drying should be done in a vacuum at the ordinary room temperature. One can avoid the drying by dissolving the freshly precipitated mucin, which is nearest the natural product, in a slightly alkaline solution to which a trace of sodium fluorid has been added (1 c. c. to a .1 per cent sol.). The mucin solution should also be sterilized, because it is necessary to use precautions in order to avoid the presence of putrefactive bacteria. Why mucin so rapidly decomposes is an open question; evidently it becomes an entirely new body. When a dried preparation is preserved for some time it becomes insoluble in slightly alkaline solutions.

When teeth are exposed to the action of mucin at a temperature of 37° C. the loss of the calcium phosphate and carbonate is plainly evident from the comparative weight of the teeth before and after the experiment. A better and more accurate method consists in estimating the calcium in the mucin solution by precipitating with an oxalate and finally, after heating, weighing the calcium as an oxid.

None disputes the fact that at the present the peasantry class has far better teeth than any other, due to the presence of large amounts of calcium phosphate in the coarse bread which is their chief article of food, and also to the prolonged mastication of this hard and, at times, five to six day old bread, causing an increased blood supply to the jaws and gums.

To prove that this theory is not without authorization, I desire to call attention to another important point which, according to my

aspect, points to mucin as the decalcifying agent. The crude, coarse bread contains calcium fluorid, which in a dilution of 1-1,000 prevents putrefaction. Calcium fluorid is not soluble, but we can accept that a decomposition takes place between the calcium phosphate and fluorid, so that a soluble fluorid results, which exerts antiseptic properties. The harmful influence of the mucin is thus indirectly prevented in that acid fermentation is retarded, and mucin is not set free. By my experiments I have proven that teeth which were exposed to the influence of mucin showed an appreciable decalcification and also noted by a difference in weight that the same result was produced when teeth were exposed to a 1 per cent solution of lactic acid. The mucin used for experiments I obtained from the saliva of patients affected with caries. The teeth placed in the mucin for thirty days compared in appearance and degree of decalcification with teeth kept in a 2 per cent lactic acid solution for the same number of days. A concentration up to a 1 per cent lactic acid solution cannot be formed in the mouth under the most favorable circumstances. The per cent may at times reach .75. The conditions are different in persons, such as bakers who inhale much sugar dust, and from such constant accommodations undoubtedly grape sugar can be directly formed, a stage which is necessary for the formation of lactic acid by bacteria.

It will be somewhat difficult to show proofs that the irritating effect of sugar and flour dust leads to an increased secretion of saliva and consequently an excessive mucin formation, and yet herein appears to be explained the so-called "baker's caries."

Lactic acid has nothing to do with the rapid destruction of teeth by caries among confectioners. The "confectioner's caries," as compared to the former (baker's caries), is more frequently developed, in that the confectioners in some direct or indirect way convey more or less sugar to the mouth. The sugar is not transformed into lactic acid, but it is quite probable that the sugar used contains a small amount of acetic acid.

A further proof for the mucin theory:

"Since such and such a disease—after a certain cure my teeth began to decay," is a statement which the dentist frequently hears.

Pregnancy favors the decay of teeth. In many women the first signs of caries appear soon after pregnancy. This is explained in that as pregnancy proceeds, the mucin glands of the mouth secrete

an excessive amount of mucin, at the same time a visible change takes place in the thyroid gland, and its mucin transportation properties may be retained or only limited.

. The maternal body requires a large amount of mucin for the construction of the embryo. In consequence of this the mucin production in the mouth is increased to four or five times the normal amount. Furthermore, if we consider that during pregnancy the resistance of the oral mucous membrane is changed, the usually healthy gums becoming irritated, inflamed and swollen, and that these irritated gums secrete excessive amounts of mucin, it becomes plain why caries stands in close relation to pregnancy.

Sacrolactic acid has not yet been found in the saliva, but undoubtedly this acid is introduced by stale foodstuffs, canned meat, fish, etc.

After using honey for some time many persons complain of toothache. In such cases an excessive amount of mucin can be demonstrated in the saliva. Honey is a mixture of fruit and grape sugar and by the action of certain bacteria lactic acid can be produced from the grape sugar. Otherwise, honey is only slightly acid in reaction, containing a trace of phosphoric acid. In certain cases where there is an abnormal amount of the buccal secretion, caries makes rapid progress.

The mucin secreted by the glands of the gums and to which I attach importance is an acid also; and because of its tenacious properties is not easily removed from dependent places by the constant flow of saliva or rubbing. It is also found in places which do not come in contact with the masticated mouth contents, that is, the vaults formed between the lips and gums and external surfaces of the teeth. How frequently do we find this the location for the starting point of caries! It is a known fact that I was able to decalcify the enamel of healthy teeth in mucin solutions.

In consistence with the mucin theory is the fact that the surfaces of teeth flooded with the sublingual secretion, or on those teeth on which tartar is deposited, do not become carious.

The calcium found in the saliva helps to keep the mucin in its normal condition. The calcium is chiefly in the form of a bicarbonate and the weak carbonic acid is readily replaced and thus a neutral calcium mucinate is formed.

Our literature mentions cases of caries in teeth that never escaped

from their enclosed alveoli and in this fact we have at hand another proof that the decalcification can be produced only by mucin, or by the influence of a mucinous degeneration of the epithelial protoplasm.

Lohman, of Germany, cites a case in which he removed a tooth from the antrum, the root being absorbed and the crown showing marked signs of decalcification.

The more tenacious the saliva, the larger is its amount of mucin and, therefore, more frequent the caries.

Lime water destroys the mucilaginous properties of slimy secretions and when applied to mucous membranes limits the secretions and seems to dry and act as an astringent to the mucous secretions. Lime water is at present the best-known remedy for dissolving mucin, a mucin compound of calcium being formed.

Tobacco seems to preserve the teeth. Nicotin stimulates the secretion, but the saliva is of a watery nature and contains only a small amount of mucin. In tobacco smoke certain bases are present.

Pyridin bases, ammonia, etc., prevent the liberation of free mucin and in this tobacco smoke also possesses antiseptic properties which prevent fermentative changes, otherwise it is probable that acids would be produced which would set free the mucin.

The saliva of cows is rich in mucin, but these animals are constantly consuming alkaline foods. In the saliva of dogs there is a proportionately large amount of mucin, but there is an absence of ptyalin, so that sugar and starch cannot be transformed into acids. The saliva of rabbits is free from mucin and thus animals' teeth are free from caries.

RESULT OBTAINED IN TREATING PYORRHEA.

BY W. A. ALLEN, D.D.S., BILLINGS, MONT.

Twenty-five years ago I commenced treating pyorrhea alveolaris and secured every article to be obtained from the dental journals and made of them a complete scrap book. After close application and treating for ten years, following the many methods and using the medicines advised, I could not look back to a single cure, although many cases improved and gave me pleasure for a time, but, almost invariably, after a few months the old conditions returned.

Visiting a blacksmith's shop I carefully forged and tempered a set of instruments and then had them nickel-plated. Thus prepared I went to work in earnest as a last resort and to my great

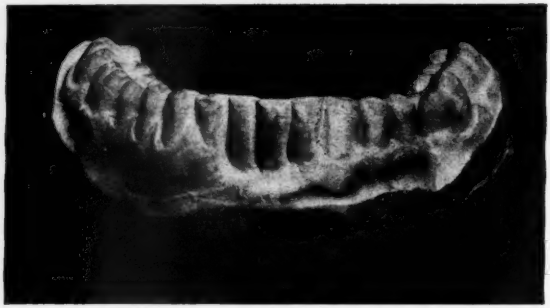


Fig. 1.

joy effected a cure with the first case, and thus discovered that I had not been reaching the very extremity of the disease.

About this time I went to Chicago and took a few lessons under Dr. J. N. Crouse on root treatment; also met Dr. Younger, who taught me more about pyorrhea than I had previously

Fig. 2.

learned in all my reading. The first requisites are a sensitive touch and well-made and adapted instruments. Ability to correctly diagnose the case in hand is the second. In what condition are the teeth? How far has the disease progressed? Does the patient need only local treatment, or does he require sys-

temic, or both? If the teeth are elongated and protruding, ligate them into correct position and alignment and, finally, as treatment progresses, effect the correction of occlusion. The next step is to carefully search with electric mouth lamp and mirror for dead pulps which should be removed and the teeth filled at once.

I scale one tooth at a sitting and never go down into the pericemental membrane again unless it shows signs of sloughing and presents pus, which is not likely if the operation has been thoroughly performed. Much is heard about tissues being lost and of the impossibility to replace them. I wish to state that the tissues in young patients can be restored to almost their normal condition where the electric massage is used and the gum festoons irritated with a bunch of cambric needles dipped into C. P. lactic acid.

Electric Treatment or Gum Massage.—My method is to use an electric switchboard, attaching two metal clasps, each provided with a moistened sponge. Placing one of the latter on patient's wrist and the other on my own I then proceed with a mild current of electricity to massage the gums, taking hold with fingers as low down as possible and gradually pressing upward, holding as tightly as the patient can stand comfortably. This is after the surgery has been completed. By this means the gums are kept in a healthy condition, the pressure forcing the blood up and sometimes out at the festoons, thus aiding in the formation of new granulations.

An interesting case is illustrated in Figs. 1 and 2. These show two models in reproduction of the case of a patient of mine, Mr. Huse, who is the junior partner of the Donovan-McCormick Mercantile Company, of Billings, Mont. This case was in the hands of some six different dentists of both East and West before reaching me. I commenced work on April 26, 1907, and discharged the patient on the first day of July, 1907. A careful impression was taken before starting, from which was made the model shown in Fig. 1. This was placed away in a private drawer and not consulted again until success had been achieved. The case was a local one and I gave no systemic treatment nor made any changes in diet, and up to the present the tissues have remained

firm and are standing up well. Fig. 2. Mr. Huse is very proud of the result, but not so much so as the writer.

In older patients the good results accruing from the treatment are not so marked, but I believe it possible to improve any gum tissues and restore all to some extent. I treat the system in all cases where uric acid presents itself, also put such patients on a vegetable diet and advise all the outdoor exercise possible. All loose teeth are ligated, as the gums will not adhere to a tooth that moves every time the patient bites. Pyorrhea alveolaris, more appropriately called phagadenic pericementitis, can be cured.

ADVANTAGES OF PROPERLY CONSTRUCTED APPLIANCES CEMENTED TO THE TEETH IN ORTHODONTIA

BY S. W. FAHRNEY, D.D.S., CHICAGO, ASSOCIATE PROFESSOR OF ORTHODONTIA, CHICAGO COLLEGE OF DENTAL SURGERY.

After being asked by the editor of the DENTAL DIGEST to contribute something along practical lines in the field of the orthodontist, my thoughts at once turned to certain methods, the practice of which has been advocated by some dentists to a great extent during the past few years. It is my intention to give to the readers of this publication some ideas that have been formed from actual practice on the selection of proper regulating appliances.

A few days ago, while reading an article on the selection of appliances for the regulation of teeth, I paid particular attention to certain statements of the author. He advocated the use of a very limited number of bands, these to be of the clamp variety, an arch bow and some metal ligatures.

In regard to the clamp bands of any make or pattern, I wish to say that it is impossible to get them to fit the tooth as perfectly as a properly measured and soldered band, the construction of which I will endeavor to describe thoroughly.

The proper selection of banding material should be made, that is, in regard to width and thickness. All bands should be as thin as possible and still possess the required strength. Generally a number 36 gauge (B. & S.) band is about the proper thickness to be used for molars and also for bicuspids to be included in an anchorage,

38 gauge is very good for bicuspids and cuspids, 38, 39 and 40 gauge material to be used on incisors, the thickness of material used depending on the strength required and the form of attachment to be soldered to the band. Bands should be wide enough to cover the sides of the crown of a molar or bicuspid and about the same width material can be used for the anterior teeth. The proper selection of material having been made, a piece should be cut off about a half or three-quarters of an inch longer than is necessary to reach around the tooth to be banded. Place the strip around the tooth with the free ends toward the buccal or labial, and then with the beaks of a pair of reasonably sharp-pointed pliers pressing the free ends of the band against the tooth, the pliers are closed, which draws the material tightly around the tooth. This drawing together of the ends with the pliers is done several times and then you have a measurement for a band which will fit the crown of the tooth perfectly from the occlusal edge to the cervical margin. The band after being properly burnished, so as to have the surplus part of the joint extend away from the band proper at a good right angle, is soldered with a high-fusing solder.

The majority of bands made in the above way will fit a gradually tapered stick or rod, which goes to prove that a band with parallel sides, such as the ordinary clamp band has, cannot be expected to properly fit the average tooth. It is also a fact that there are but few cases in which the occlusal or incisal margin of the band is not smaller than the cervical border, which makes it possible to very easily place the soldered band in its proper position.

The author of the article before mentioned strongly advocated the use of the so-called simple methods for the regulation of teeth. The old method, as he classed it, of inventing and constructing appliances for each case was found to present too many difficulties, such as securing proper material and instruments, immense amount of time consumed in their construction, application and operation, together with great inconvenience and suffering for the patient.

It becomes necessary for me to say that I do not agree with the writer in regard to the above statements. As to the difficulties of obtaining material and instruments we will admit that in the earlier days of the practice of orthodontia such difficulties were experienced to some extent; but, due to the advancement also in

the so-called old method, it is at the present time possible for the practitioner to obtain each and every article needed for practicing such a system.

The more complicated cases of regulation of the teeth demand very careful thought and consideration, and it is never advisable to start the work blindly with the hope of its coming to satisfactory completion. Each case has its own peculiarities, and by giving special attention to the minor details the operator will get the best results. For this reason I deem it advisable to construct an appliance to do the particular work at hand. If a tooth should be rotated or turned in its socket to place it in the proper position the appliance should be planned and constructed accordingly. By having a band on the tooth it affords a firm attachment for the force to be applied, whether it be the positive force from a jack screw, a spring rotating lever or that obtained from ligatures of rubber, silk or metal. Very often in the more difficult cases it becomes necessary to use a combination of two of the above-mentioned methods to properly turn the tooth. Generally this combining of methods is a simple matter, for after an attachment has been soldered to the band to hold a rotating spring or jack screw in position it is very easy to use the same attachment to hold a ligature. This is merely one simple case which shows the advisability and advantage gained by the construction of a special appliance for each case.

By constructing an appliance for the case under treatment, it will simplify the work in the patient's mouth a great deal. It is much easier to take a wrench and turn a nut a few times than to remove old ligatures and replace new ones, whether they be of silk, rubber or metal.

The average time spent at each visit taking care of a case which has a properly constructed appliance cemented to the teeth is very short. Very often it takes but a few seconds to tighten the appliance and after seeing that nothing has been accidentally broken during the patient's absence from the office, the patient is sent home. Such is not the case when, in order to save time in the construction of the appliance, one of the simpler methods is used, for all the time saved by not constructing the proper appliance is soon spent in the additional work necessary in caring for the patient each visit. In my opinion it is much easier for the operator to have

the principal part of the work come at one time, for after centering his mind on the case to be treated he is able to plan and construct the appliance necessary, and then the treatment of the case can be practically dismissed from his mind.

The construction of a regulating appliance for some cases takes considerable time, but even this need not worry the general practitioner who does not care to do that class of work. It is possible for him to have the proper appliance constructed ready for cementing to the teeth, and in this way it makes the work necessary for him to do very light. The bands are placed in their proper positions on the teeth and the occlusal edges of the molar and bicuspid bands are burnished if necessary. The anterior bands after being placed in their proper positions are removed and trimmed so that they will be no wider on the labial surface than necessary. In this way an unpleasant feature of having bands on the anterior teeth can be obviated, for it is often possible to trim the bands narrow enough that they do not show in ordinary conversation. The narrowing of the bands must not be overdone, however, for the necessary strength must always be retained.

After having all bands properly trimmed and temporarily fitted to the teeth it is also advisable to fit any jack screws or wires which may be necessary, for by so doing the work of permanently placing the appliance is often made much easier. After the bands and attachments have been found to fit properly they are removed and all bands washed in alcohol. Several of the teeth to be banded are then kept dry and after applying a small rope of cement on the inside of each band to be placed at that time and near the cervical border, the whole is finally malleted to position, using a wooden plugger. With the finger the surplus cement is then rubbed over the edge of each band so as to be certain all space between the band and the tooth is properly filled. The cement is allowed to harden and all surplus on the crowns of the teeth is removed. A band cemented in this way will cause no trouble from decay unless it should get loose and be allowed to remain loose for some time. This, however, can be avoided.

At the present day a great many dentists seeing the possibilities in the field of orthodontia are anxious to take up the work, and not having had the proper experience they struggle in the darkness.

They are told new methods have been discovered which make the regulation of teeth a simple matter, and being told the work is easy they try their luck and, unless the case is very simple, fail.

While writing this article a patient came to my office who said she had been having her teeth regulated and the dentist doing her work had advised her to consult with me in regard to certain details of the operation. The first glance into the mouth made it clear that I had been called too late, for, although the operator probably did it unconsciously, a great deal of damage had been done. This is merely one of the many instances of the inexperienced operator overestimating his ability to do regulating.

It is not my intention or desire to discourage any dentist along these lines of treatment and care of their patients' teeth, but I merely wish to give a word of warning to those whose experience in the regulation of teeth has been meager. If after the careful study and consideration of the case you cannot see success ahead, it is always advisable to ask the aid of someone who knows what should be done.

Although the task of regulating teeth has of late been pictured to be simple and easily accomplished, I wish to say that, in my opinion, such is not a fact and never will be, for there is no other branch of dental surgery which presents as many varieties of conditions that demand careful consideration. This necessarily complicates the work and the man who wishes to be successful in the regulation of teeth must not look for a short cut to success. He must use the appliances necessary, and if they are simple his task is an easy one; but if the work necessary is more complicated, he must not look for the best way to get out of doing it, but the best way to accomplish the desired results, which means his success and the good-will of his patients.

THE VALUE OF SKIAGRAPHY IN DENTAL PRACTICE.

BY F. K. REAM, D.D.S., M.D., CHICAGO.

There are many abnormal conditions which present in a busy practice, both of the general practitioner and the specialist, wherein it is difficult to make a correct diagnosis. This is especially true of the extraction specialist whose services are often

demanded for the removal of teeth and roots, the exact location of which cannot be ascertained with the eye or instrument.

In the diagnosis of such pathologic conditions as diseases of

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

the antrum and abscessed areas about the roots of teeth, skiagraphy can only be considered as an invaluable aid and not as a positive means by which the diagnosis of these conditions can be made. But in all cases of misplaced, unerupted or impacted

teeth, fractured roots, imperfectly filled root canals, etc., the X-Ray is a means by which the position of such teeth and roots can be definitely located. There is no question but that the X-Ray should be used more in the general practice of dental surgery than it is at the present time.

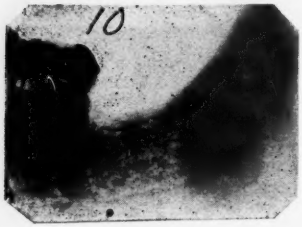


Fig. 10.

Fig. 11.

Fig. 12.

Fig. 13.

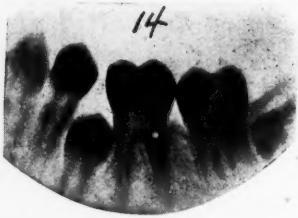


Fig. 14.

I shall now direct your attention to several interesting skiagraphs which were taken from cases in my practice and which emphasize the importance of radiographic work.

Fig. 1. This skiagraph shows an impacted lower third molar imbedded deeply in the process. The mouth was completely closed

from extensive swelling of tissues. The tooth was hidden from view and could be felt with an explorer only with difficulty. The patient was anesthetized with gas and oxygen and during an effort at extraction the tooth completely disappeared.

Fig. 2. This skiagraph shows the tooth referred to above

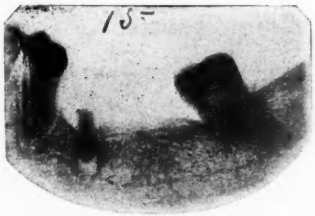


Fig. 15.

lodged deep in the body of the jaw. It is seen at the extreme lower left corner of the illustration. Great difficulty attended its removal.*

Figs. 3, 4 and 5 are skiagraphs of typical impacted lower third molars. In the second molar in Fig. 5 is shown, also, a metallic filling in close proximity to the pulp.

Fig. 10 illustrates the difficulty with which certain fractured

Fig. 16.

roots are removed. The skiagraph shows excementosis of the root. This condition being known in advance of the operation greatly facilitates the removal of the root.

Fig. 11 shows the result of a careless or indifferent effort at extraction. After the crown of the tooth had been broken off

[*Reference to the operation of removal of this tooth may be found in the paper by Dr. Ream in September DIGEST, page 979.—Editor]

the patient was advised to "let the roots work out or you would only expose the bone."

Fig. 12 is an unerupted lower third molar. Skiagraphy is the only definite means by which the exact location and position of unerupted teeth can be determined.

Fig. 13 shows an impacted lower third molar in a case where the first molar had been extracted. In operating here the space

Fig. 17

should be supplied with a wooden block (Nevius), thus supporting the second molar during the extraction of the impacted tooth.

Fig. 14. Impacted second bicuspid in V-shaped space. Dr. Nevius has devised forceps expressly for the extraction of such

Fig. 18a.

Fig. 18b.

teeth. These have very thin blades or beaks that will pass through the narrow space. Great care should be exercised in the removal of such teeth so as not to loosen or injure the teeth on either side.

Fig. 15 shows the end of a root which was deeply imbedded

in the alveolus. It is difficult to know in such cases as this, unless the end of the root is seen, whether the whole of the tooth is out or not. If there is any doubt, the X-ray should be used and the point definitely determined.

Fig. 16 shows a condition which greatly interferes in operating. There was an impacted third molar and the first molar had been

Fig. 19.

Fig. 20.

extracted previously, the resultant space being filled. The second molar, as shown in the skiagraph, is elongated.

Fig. 17. There are many anomalies seen in dental practice. This skiagraph shows not only an impacted but, also, transposed

Fig. 21.

bicuspid. Every dentist should keep a record of the anomalies that occur in his practice, as the history of such cases forms a valuable addition to dental literature.

Figs. 18 a and 18 b show a variety of misplaced, unerupted and impacted teeth.

Figs. 19 and 20. The orthodontist is often at a loss to know the location of unerupted teeth. This skiagraph shows the exact position of impacted and unerupted cuspids.

Fig. 21. As intimated in the introductory part of this paper, the X-ray often proves valuable in clearing up the diagnosis of obscure antral and abscessed cases. This skiagraph shows a necrotic area about the roots of the central and lateral incisors very clearly.

In closing, I desire to pay special tribute to Dr. H. L. Lewis, of Chicago, for his untiring efforts and labor in obtaining almost perfect results with the X-ray. All of the skiagraphs shown herein were made by him.

AMALGAM.—I believe, thoroughly, that the use of amalgam in the hands of competent dentists will work for our patients a marvelous result in the saving of the teeth. I will not except even gold, when I say I know of no material that has done so much for the dental profession, especially in the saving of the teeth of the poorer classes as the material we call amalgam, and I believe the reason that there are so many failures is simply because some point has been neglected or overlooked, and there has been an improper preparation of the cavity, an improper manipulation of the amalgam, and a want of understanding of what kind of material it is and its proper insertion in the cavity.—DR. GEO. A. CRISE, *Western Dental Journal.*

DO NOT DEPEND ON CEMENT ALONE FOR RETENTION OF INLAYS.—I firmly believe that I voice a very great majority, if not all, of the successful inlay workers of to-day, when I say: Not until such time as we are favored with a bond that will so attach itself to tooth-structure and to porcelain that it becomes, so to speak, a part of both, will we be justified in depending upon the adhesion of cement to retain inlays in position. If the adhesion of cement will not retain inlays in position and suffering humanity is to be benefitted by inlay processes, it becomes necessary to recognize and take advantage of certain mechanical principles, which have for their support something more palpable than mythologic concepts.

The formation of the cavities should at once be indicative of permanence; for a retentive form or box-like receptacle not only favors but takes advantage of all the theories of retention, good, bad, and indifferent, known to the profession at the present time. Right-angle walls form in themselves the strongest resistance against force, and inclined planes facilitate adaptation, which, with increased cavity surface, enhances the adhesion theory and at the same time lends assistance to "frictional resistance."—DR. C. S. VAN HORN, *Dental Cosmos.*

Digests.

SOME ADVANCES MADE IN DENTISTRY IN THE PAST FIFTY YEARS. By C. N. Johnson, M.A., L.D.S., D.D.S., Chicago, Ill. It is not my purpose to attempt to deal with all the variations in methods of practice during the past fifty years; I shall, therefore, refer only to a few of the developments during that period which to me appear of greatest moment to the profession.

INTRODUCTION OF THE RUBBER DAM.

First was the introduction of the rubber dam in the early '60's. Fifty years ago the operators were trying to keep cavities dry by stuffing the mouth with napkins, and laboring under all the difficulties incident to such an uncertain and disagreeable method of practice. While operators in those days became very expert in the manipulation of napkins in the mouth, yet it was simply impossible in all cases to control the saliva and keep the teeth dry. The rubber dam has done more to revolutionize dentistry than any other one advance in the last fifty years. Aside from the possibility it introduced for the insertion of cohesive gold into large cavities calling for contour restorations, it rendered possible the practice of aseptic dentistry in all those cases where infection is an important factor to be reckoned with. It is true that the septic problem was not recognized at the time the rubber dam was introduced, but the moment it was recognized the dam proved the most effective instrumentality in equipping the dentist to take advantage of the knowledge newly gained. What would we do today with many of our pulpless teeth were it not for the rubber dam? We control disease more certainly and lessen the number of our treatments by half through the possibility it presents of keeping out fresh infection, and I cannot pass without expressing the wish that the virtue of this agency in the treatment of pulpless cases were more generally recognized and practiced by the profession. Today we save thousands upon thousands of natural teeth and render them useful and ornamental organs of the human economy which fifty years ago would summarily have been consigned to the forceps, but these thousands might be increased many fold if the profession took full advantage of the opportunities presented them by the protection afforded by the use

of the rubber dam and the knowledge we possess of the value of aseptic treatment.

EMPIRICAL USE OF DRUGS.

And this knowledge is largely a development of the last half century. What was known definitely by the founders of this society about the virulence of septic matter when forced through the apex, or what did they know of the cause of the terrible upheavals which sometimes occurred in the apical space? If men used drugs in those days they used them for the most part empirically and without any clear idea of how they accomplished a result. There is some empiricism in the profession yet, but we certainly know more of the phenomena of infection and the specific action of drugs than was known fifty years ago. And this knowledge if properly applied may be made of inestimable value to the community at large through a better control of disease in the oral cavity.

USE OF COHESIVE GOLD.

Another development of the past fifty years is the use of cohesive gold in restoring the original form of the tooth by filling where an appreciable portion of the crown has been involved in caries. It must have been about fifty years ago when the cohesive property of gold foil was discovered, but it was at first thought to be a detriment and was not utilized till later. The idea of restoring the contour of a tooth by filling as we do now was not thought of at that time, and in fact it was long after the use of cohesive gold became general that the real philosophy of reproducing original forms in decayed teeth became apparent. In the early days the only thought was to stop decay, and an operation which accomplished this was considered a success. Now we are not content with this achievement, but we must also render the tooth comfortable for mastication through a recognition of the significance of the contact points on proximal surfaces and the proper form and function of the interproximal spaces.

And this advance I deem to be one of the very greatest importance. The ability to contour fillings by the use of cohesive gold, and the consequent comfort in mastication, has popularized operative dentistry among the people more than is generally realized, and this is becoming more and more important as the nervous tension of our patients is being raised, so that the lodgment of food in

improperly formed interproximal spaces is proving a constantly increasing source of irritation.

ETIOLOGY OF DENTAL CARIES.

The etiology of dental caries is another subject upon which much light has been shed in the last half century. There had been considerable conjecture in the minds of the profession as to the cause of this disease and various theories had been advanced, many of which were wide of the mark. Some thought that the cause was inherent in the tooth structure itself, while others contended that the general condition of the fluids of the mouth had all to do with it. But there were others who were more nearly on the right track, though no one was conversant with the real cause. As far back as 1828, Robertson intimated that the carious process was the result of some influence acting directly on the enamel at the precise points where cavities were to occur, and this is perfectly in accordance with facts; but his conception as to what it was that acted was very vague and was summed up in the idea that it was due to "decomposition." Long after 1857 Miller showed that caries was due to an acid formed as the result of microorganic growth, and demonstrated this by experimental work. This fact was therefore established well within the period, and while there are yet many factors in the phenomena of caries which we do not well understand, this demonstration by Miller placed the question upon a scientific basis and gave us a logical hypothesis to work from.

Further Light Needed. What we particularly need further light upon, in connection with this disease, is a better understanding of the conditions which influence the progress or retardation of caries. We need to know why some mouths are practically immune from this affection while others are peculiarly susceptible to it, and also to know why it is that in the same mouth there are periods when the disease progresses very rapidly and others when it is apparently in almost total abeyance. It has seemed difficult to get the profession generally to recognize the clinical manifestations of these varying conditions, though they are unmistakably evident to a close observer; and up to this time it has seemed equally difficult for those who have observed them to suggest any plausible theory to account for them. There must be certain unrecognized elements in the mouth tending to influence the conditions of immunity and

susceptibility, and it remains for future scientific investigations to determine what they are and point them out to the profession.

A BETTER UNDERSTANDING OF CONDITIONS WHICH CONTROL DISEASE.

The next great advance in dentistry should come through a better understanding of the conditions which control disease, and following this we may hope to discover some means of controlling the conditions and thereby prevent the disease. Let us hope that well within the next fifty years this may be brought about. In fact, at the present time Dr. F. W. Low of Buffalo, N. Y., is working along a line which promises to throw light on this subject. He has found that in cases of typical susceptibility there is an excess of ammonium salts and an absence of sulphocyanids, while in immune cases there is an excess of sulphocyanids and a reduced amount of ammonium salts. From this it would seem as if the significant factor in dental caries was connected with the sulphocyanids, and a further development of this investigation will be watched with great interest.

AFFECTIONS OF THE PERICEMENTAL MEMBRANE.

Another affection of the mouth which was practically unrecognized half a century ago relates to the disease which causes the loss of so many teeth through destruction of the pericemental membrane and surrounding tissues. The term "pyorrhea alveolaris" was not invented fifty years ago, and while there are those in the profession who claim that it never should have been invented at all, yet it has evidently come to stay, as it represents in the mind of the profession a condition which results in the loss of so many teeth annually. The etiology of this disease or group of diseases is not so well understood as that of caries, there being a great diversity of opinion in the profession as to the cause, and while this is in some sense a serious reflection on the profession, yet we are recognizing the disease and treating it more effectually than did the practitioners of fifty years ago. Whether or not it is more prevalent today than then we are at least more keenly alive to its depredations, and our literature is filled with suggestions for its control.

CROWN AND BRIDGE WORK.

The past fifty years has witnessed the introduction of crown and bridge work, a method of practice which has resulted in pro-

longing the usefulness of teeth and roots long after the natural crowns have been destroyed by caries. If any artificial crowns were used in 1857, they were of the most primitive sort and were fastened to the roots with wooden pegs. While they were often better than none they were not to be compared with the crowns of modern dentistry either in ingenuity of workmanship or length of service. In fact, the ingenuity displayed in the manufacture of crowns today has made it so fascinating to many operators that they have frequently resorted to crown work and have cut off thousands of teeth that might better have been filled.

Bridge work has opened up a fruitful field of effort in supplying lost teeth in many instances where otherwise an artificial plate would have been necessary. The possibility of dispensing with a plate is a great boon to the patient and it has sometimes tempted operators to go to an extreme in the use of bridge work and employ it in cases where good judgment would dictate against it. All good things are subject to abuse by enthusiasts, but this should not argue against their legitimate use, and when the aggregate serviceability of crown and bridge work is considered it will be found that its introduction into the profession marked a very important advance. If we wish to realize just how great this advance has been let us imagine ourselves in the position of the practitioners of a half century ago and have one of our lady patients come in with the crown of a frail lateral incisor broken off even with the gum. In those days there was little to be done with such a case except to insert a plate, while today the transformation wrought by the skilful dentist in a few hours in a mouth marred like this is well-nigh miraculous. I sometimes think that people get so in the habit of having these transformations made for them that they lose sight of the skill behind the operation and take it too much as a matter of course. They never stop to consider the painstaking effort and inventive genius which has been necessary to develop the methods of modern dentistry to where they are, and this is not only true of the public but often true of the young practitioner who has come upon the field since these methods were well established and systematized. Place the recent graduate of today back in the position of the men of fifty years ago with the same equipment and facilities for work and the same teaching, so far as the technique of operations is concerned, and he would cut a sorry figure in trying

to serve his patients. The rising generations do not sufficiently pay tribute to the efforts of the pioneers, nor do they realize to its full extent the amount of labor and application it has taken to perfect the methods they are using today. But this is after all only natural and in line with the tendency of every age to accept the knowledge gained through the achievements of the past as its rightful heritage.

PRINICIPLES OF CAVITY PREPARATION.

Another advance made in the past fifty years is a better understanding of the principles involved in cavity preparation. This subject has been taken out of chaos and systematized in such a way as to constitute almost a new method of practice. The establishment of cavity outlines at certain points to prevent the recurrence of decay around fillings, the formation of cavity walls to secure the strongest possible mechanical anchorage of the filling with the least weakening of the tooth structure—all of this has been accomplished to a degree which has made it possible for an operator to serve his patients to better advantage and with a more certain promise of success.

INLAY WORK.

One of the most recent developments emanating from the ingenuity of dentists is the introduction of inlay work. This has brought about quite a revolution in many offices in the methods to be employed for saving decayed teeth, and while its definite status as a permanent method of practice has not yet been sufficiently established, yet it has demonstrated beyond doubt that within certain limitations it is capable of great service to our patients. It has become so much a part of modern practice that no one can afford to ignore it, and yet with this as with every other innovation there are enthusiasts who go so far in its advocacy and its use as to jeopardize its reputation by their utter lack of conservatism. Inlay work has demonstrated possibilities that cannot be ignored, and if used under its indications and with discriminating judgment it fills a niche in our armamentarium for the preservation of the natural teeth which has never been so satisfactorily filled before by any method at our command. All honor to the men in the profession who have labored to place this work on an established basis. While there is still room for perfecting the technique and simplifying the methods, the fundamental idea of inlay work

has been so thoroughly engrafted as to make it an important factor in our every-day practice.

ORTHODONTIA.

Another department of our science which has grown up in fifty years is that of orthodontia. And what a marvelous development it has been. Today the specialist in this field takes the child with mouth and face deformed, grotesque and even hideous, and by the magic of his art transforms it into a thing of symmetry and beauty. And the wonder of it is that so much transformation can be made with so little discomfort. I doff my hat in respectful admiration of the men who have made this miracle possible, and I am proud to be associated with a profession which has such men in it.

ORAL SURGERY.

Then again the field of oral surgery has been practically revolutionized, and operations are successfully performed today which were undreamed of in 1857. When surgery of the mouth was attempted in those days it was accomplished with unsightly scars left by opening from the outside through the lips or cheeks, while now the same operations are performed without leaving any external evidence by approaching the work through the mouth. One of the greatest advances in oral surgery has been the development of cleft palate operations, the perfection of results in many of which is well calculated to challenge the admiration of mankind.

Another recent development of surgery of the mouth is the preservation of the normal contour of the face after removal of extensive sections of the jaws by injecting warm paraffin into the soft tissues, molding it to the proper form and allowing it to harden. I have witnessed one case where half the lower jaw had been removed, and yet in conversation with the patient I was unable to detect any abnormality.

DENTAL LITERATURE.

In the past fifty years there has been a wonderful development in dental literature, both periodical and in the publication of new books. In 1857 all the dental journals of the world could probably have been numbered upon the fingers of one hand, while today it is impossible to make an accurate estimate of them, those in this country alone numbering more than twenty of regular monthly appearance. The dental libraries of those days while entitled to our respect as representing the worthy efforts of a struggling pro-

fession could not be compared with our present libraries in either the number of books or in the character of their contents. In fact, one of the most hopeful signs of the times is the frequent issuance of new books devoted solely to dentistry—and books, be it said, which for excellence of the matter they contain, both illustrative and textual, may well be compared with the best literature of any profession.

DENTAL EDUCATION.

In keeping with the spread of dental literature has been a decided advance in dental education. I am not aware of the number of colleges in existence in 1857, but there could not have been more than three or four, and their facilities for teaching dentistry would have been laughed to scorn by the student of today. It might be considered unbecoming in one who has been so closely associated with this work throughout nearly the whole of his professional life to speak of the achievements in this line of effort, but the records stand for themselves and require little amplification. In comparison with the educational systems of other professions, it is only necessary to quote the statement of a very prominent member of the medical profession, one who is a college professor and who stands high in medical educational circles. He said, in discussing the methods of teaching in medical and dental colleges, that it was manifestly evident that in the dental colleges the student was better equipped at graduation to go out and serve the people creditably than was the medical graduate to practice medicine. If this is true, and we believe it is, then the only lesson from it should be to double our efforts in this direction so that we may not only maintain our present record, but attain to higher and still higher ideals in a field of labor which is really at the very foundation of all that we may expect of progress in the future.

But with all of the advances to which I have thus briefly called attention there is no one to my mind more encouraging or more potent for good than the change in professional spirit which has come over dentistry. It is true that here and there the profession showed at that time a laudable disposition to spread knowledge among its members. In the earlier days men were for the most part secretive with their methods of practice; office doors were kept guarded, and a spirit of selfishness prevailed which was in striking contrast to the liberality of the present day. Now the

members of the profession vie with each other in their efforts to impart knowledge to others, and whenever any new idea is evolved it is at once published far and wide with the utmost liberality. This is one of the most hopeful signs of the times, and so long as dentistry shall have a name there can be no loftier mission among its members than to foster the sentiment of a universal brotherhood of man so well typified at the present time by the leading lights of the profession.—*Dental Summary.*

THE ARTICULATION OF FULL ARTIFICIAL DENTURES. By George B. Snow, D.D.S., Buffalo, N. Y. While much thought has been bestowed upon the construction of artificial dentures, so far as their appearance is concerned, and the selection of the teeth to agree in size, shape, color and arrangement with the age and temperament of the patient has become well understood, their arrangement from a mechanical standpoint, so that the dentures will be of the greatest possible service in mastication, has been generally ignored. The distinction between occlusion, or the simple meeting of the morsal surfaces of the teeth of the upper and lower sets (something which may be secured with almost any arrangement of the teeth of one set, those of the other being fitted to them), and articulation, in which contact of the teeth of the two sets will occur at a number of widely distributed points when the mandible is moved laterally, as in mastication, has not received the attention that it should.

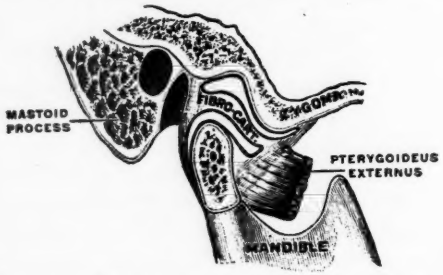
The correct articulation of the teeth is a mechanical problem, and its comprehension involves the understanding of the movements of the mandible, and the anatomic peculiarities of its articulation with the temporal bones. And as these joints are complicated in their construction, the mandible having more free movements than does any other bone in the body, a careful study of the anatomy of the parts is required for a clear comprehension of this part of the subject.

The condyles of the mandible articulate with the glenoid fossæ of the temporal bones. The fossa is situated at the root of the zygoma, and is a mere depression, not corresponding in shape to the condyle which it receives and which occupies only a part of it, its rear portion being occupied by a portion of the parotid gland. The articulating surface for the condyle extends forwards, beyond the

fossa, on to a prominence which forms a part of the root of the zygoma, and is known as the eminentia articularis. The articulating face is therefore inclined forwards and downwards.

The condyle is suspended from the temporal bone by means of the capsular ligament, which is attached below to its neck, and above to the edge of the articulating surface of the fossa and eminentia; also, by the stylomandibular ligament which extends from the styloid process downwards and forwards to the ramus, near its angle, and the internal lateral ligament which extends from the spine of the sphenoid to near the posterior dental foramen of the mandible.

The mandible is thus permitted free forward movement. Its



Temporo-mandibular articulation in sagittal sections. (Testut.)
Fig. 1.

movement backwards is controlled by the external lateral ligament which arises from the posterior portion of the zygoma, under the masseter muscle. This ligament plays an important part in the mechanism of the joint. It is triangular in shape, its lower edge running backwards and downwards to its insertion well down upon the neck of the condyle. Its upper edge is attached to the zygoma, and its rear edge merges into the capsular ligament.

Interposed between the condyle and fossa is the interarticular cartilage. This is oval in shape, thin in the center, thicker at its edges, which join the capsular ligament. There are two synovial sacs; one between the condyle and cartilage and another between the cartilage and the fossa. The condyle has a very limited ginglymoid movement in the lower sac, the backward swing of the mandible being arrested by the lower edge of the external lateral ligament by the time the incisors have been depressed from a quarter

to half an inch. The upper synovial sac affords a free direct forward movement to the mandible, it being drawn forward by the external pterygoid muscles, which are inserted into the necks of the condyles and the front edges of the interarticular cartilages. If both external pterygoid muscles contract, the mandible is protruded. If one of them contracts, the mandible is swung laterally. When the mouth is opened, the condyles move at first in the lower synovial sacs; then, when the lower edge of the external lateral ligament is rendered tense by the backward swing of the ramus, the point of insertion of its lower edge becomes a new center of motion.

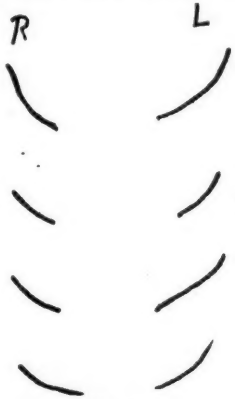


Fig. 2.

The neck of the condyle turns upon it, and its articulating face, with the interarticular cartilage, moves forward upon the eminentia. If the mouth is opened very widely, as in yawning, the external pterygoid muscles contract and draw the condyles still further forward. By the energetic contraction of these muscles, the capsular ligament is sometimes ruptured in front where it is thin and weak, and the condyle then passes forward over the eminentia and into the zygomatic fossa, causing a dislocation of the mandible.

These movements of the condyle upon the eminentia articularis can be recorded diagrammatically by means of an instrument capable of firm attachment to the mandible, having an arm which will carry a pencil point, touching the cheek directly over the center of the condyle. The point will then follow closely the movements of the condyle. Usually the diagrams thus obtained are more or less

curved, the concave side facing upwards. The amount of curvature and also of inclination varies with different subjects, and often upon the two sides of the same individual. (See Fig. 2.)

According to Dr. W. E. Walker the angle of inclination of the the angle of inclination of the "condyle path," as it is termed, varies from 30° to 50° from the perpendicular, taking the facial line (a line touching the brow and upper lip) as vertical.

He defines the occlusal line, or plane, as touching the cutting edges of the lower incisors and the disto-buccal cusp of the lower second molar, and states that this line forms an average angle of

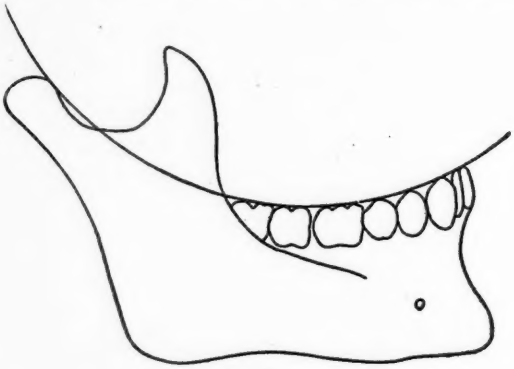


Fig. 3.

75° with the facial line. The occlusal plane will then form an angle with the condyle path of from 25° to 45°.

As instances of the variations in the inclination of the condyle path to be found in practice, he mentions one case in which its angle with the occlusal line was 1° upon one side and 10° upon the other; another, in which the angle was 22° upon one side and 44° upon the other.

So far as the articulation of the teeth is concerned, the extreme movements of which the mandible is capable have no bearing. As has been pointed out by Dr. Walker, and again by Prof. Carl Christensen (*Cosmos,* October, 1905), the articulation of the teeth implies the contact of one set with the other. The moment that the two sets are separated, there is no articulation. Therefore, it is only the sliding movements of one set upon the other, and that portion of the condyle path which is active in producing these

movements, which require study. This is a limited portion of the path, executed as the condyle leaves its fossa and mounts upon the eminentia articularis. If the path is curved, it is the most abrupt part of the curvature.

In the construction of artificial dentures it is not expedient to imitate all the peculiarities that are to be found in the articulation of natural ones.

For instance, in natural dentures there is often found an amount

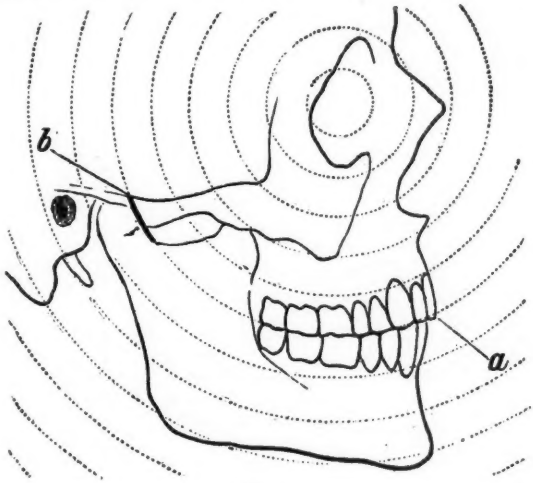


Fig. 4.

of overbite which would be fatal to any hope of wearing artificial dentures with comfort. In their construction we are confronted with a condition which does not exist in nature, for our artificial substitutes are only retained upon the alveolar ridges by adhesion and gravity. Our inquiry should, therefore, be so directed that we may learn how to secure for the patient the advantages of what has been termed a "balancing bite;" giving contact between the teeth of the opposing sets at a number of widely distributed points during the masticatory movements of the mandible. In a word, we must learn how to secure a good articulation.

The limits of the mandibular movements to be considered, then, will be the "incisive," when the mandible is protruded sufficiently to bring the cutting edges of the lower incisors against those of

the upper ones, and then retracted until the teeth are in occlusion, and the "masticatory," when the mandible is depressed sufficiently for the introduction of a morsel of food between the teeth; swung laterally outwards upon the side on which the food is placed; again elevated to crush the food, bringing the teeth into contact; and then swinging laterally inwards to, or a little beyond the central position to grind and comminute the food. The "protrusive" move-

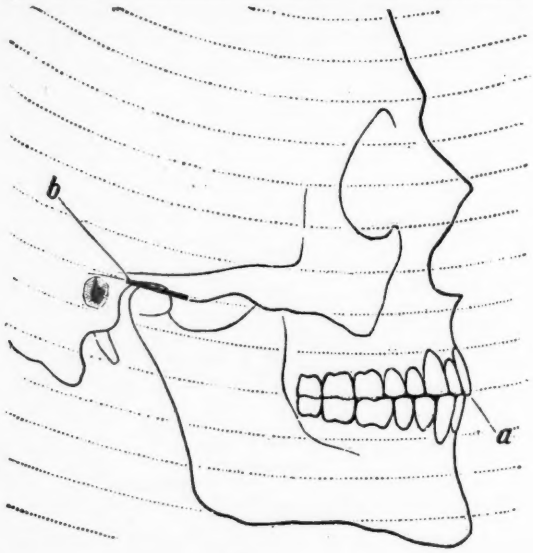


Fig. 5.

ment, in which the mandible is drawn forward by the pterygoid muscles to the limit of its movement, need not be considered.

Of these two sets of movements, the incisive is the more simple, consisting, as it does, of the depression of the mandible, its protrusion, and its subsequent elevation and retraction to the position of occlusion, and it will be the first to be considered. For the present part of this discussion any consideration of the overbite, or overlapping of the upper incisors over the lower ones, or of the cusps of the teeth, will be neglected, and the articulating surfaces of the teeth will be supposed to have a configuration which will allow the lower teeth to move upon the upper ones without break-

ing the contact of one set upon the other. It will also be sufficient to suppose the movement of depression to involve only the movement of the condyles in the lower synovial sacs of the joints, to be followed by a simultaneous contraction of both external pterygoid muscles, and the subsequent elevation and retraction of the mandible. Of these movements, the ones to which attention is especially directed are those of the elevation and retraction of the mandible, for then the incisors come into contact in biting off a morsel of food, and afterwards pass backwards into occlusion.

The downward and forward inclination of the articulating sur-

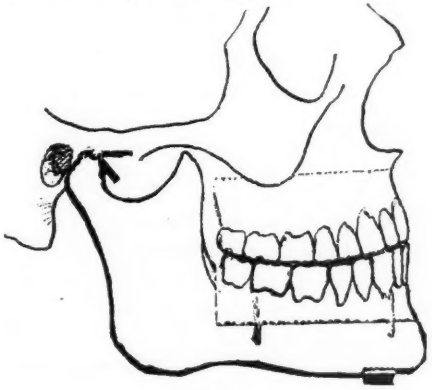


Fig. 6.

face of the glenoid fossa has already been mentioned; also, that the amount of inclination varies, not only in different subjects, but, in many instances, upon the two sides of the same individual.

It is also well known that when a lateral view is taken of a skull having a perfect, well-arranged set of teeth, the grinding surfaces of the bicuspids and molars will be seen to be disposed in a curve, not in a plane; the bicuspids being at the lowest point, with a gradually increasing rise of the morsal surfaces of the molars, proceeding from before backwards. This curve is called the "curve of Spee," or the compensating curve. Its convexity varies much in different individuals; in some instances being so great that if produced, it would pass in front of the condyle. (Fig. 3.)

Leaving out of the question the irregularities of the articulating surfaces of the teeth, and considering their common articulating

surface as a portion of a curved surface (the compensating curve), it is apparent that this curve must be, theoretically, at least, the arc of a circle, for the only surfaces which can be moved one upon the other and retain contact at all points are those generated from circles or straight lines. (A straight line may be considered as the arc of a circle having an infinite radius.) And the only condyle movement which would admit of a fore-and-aft movement of the mandible, if the articulating surfaces of the teeth maintain contact during the movement, will be when the condyle path is either

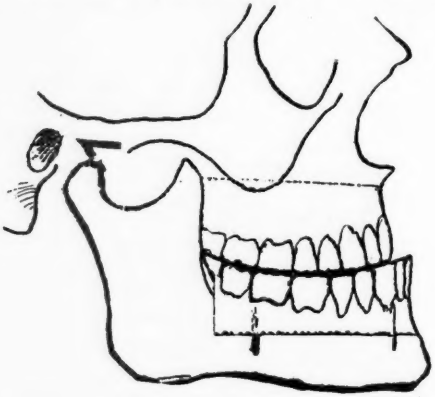


Fig. 7.

an arc of the same circle as the compensating curve (Fig. 4) or of another circle having the same center (Fig. 5).

(The length of the condyle path is so short when compared with the diameter of the circle of which it is supposed to form an arc, that for the present it may be represented by a straight line.)

By the use of diagrams having shifting mandibles which may be moved either in level or inclined condyle paths, this matter may be clearly illustrated. And by the use of two such diagrams, one with a curved articulation line, the other with a straight one, each having both horizontal and inclined condyle paths, the necessity for a correspondence between the curvature of the articulation line and the inclination of the condyle path may be made apparent. Figures 6, 7 and 8 show such a diagram with a curved articulation line. In Fig. 6 the teeth are in occlusion. In Fig. 7 the mandible

is protruded, the condyle following the inclined path, and contact between the teeth is preserved. In Fig. 8 the mandible is protruded, the condyle following the level path, and only the molars are in contact. This shows what may happen in the construction of a full artificial denture by guessing at the amount of compensating curve and using a great deal of it when only a little is required.

Figures 9, 10 and 11 are from a similar diagram having the teeth set so that their morsal surfaces form a plane; the articulation line being straight and level. Fig. 9 shows the teeth in occlusion.

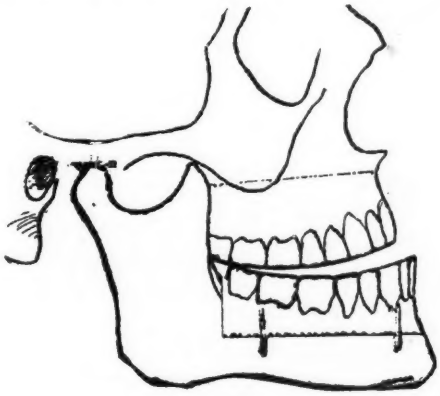


Fig. 8.

In Fig. 10 the mandible is protruded, the condyle following the level path, and contact of the teeth is maintained. In Fig. 11 the condyle follows the inclined path, and only the incisors are in contact. This shows why artificial dentures with the teeth set up without the compensating curve are sometimes so troublesome to the patient. Any lateral movement of the mandible moves one condyle forward, and if the condyle path is inclined that side of the mandible is depressed; it is impossible for the teeth upon that side to make contact with their opponents. The bearing of the teeth being entirely upon one side, the plates are apt to tip; and so, until the patient has learned to abandon the lateral masticatory movements of the mandible entirely, and to use only a straight up-and-down bite, but little service can be had from such dentures.

These diagrams show, beyond question, that there is a relation

between the condyle paths and the compensating curve which must be taken into account in the construction of artificial dentures, and that there is an absolute necessity for the employment of an articulator with adjustable joint slides, by which the inclination of the condyle paths of each individual case may be imitated with a fair degree of accuracy. Fortunately, absolute accuracy is not required. If it were, full upper and lower dentures could not be worn with satisfaction. Patients become accustomed to them by use, even though they are defective, and there is some elasticity to the tissues

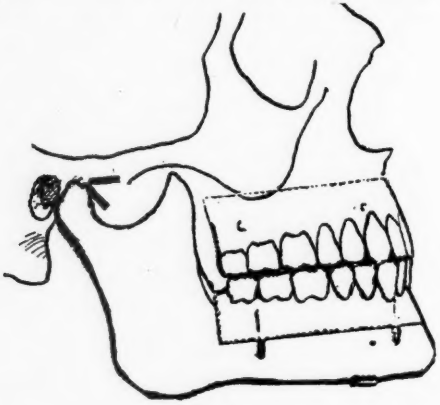


Fig. 9.

of the alveolar ridges and joints which compensates for slight inaccuracies.

For the diagrams illustrative of the relations between the condyle path and the compensating curve, the writer is indebted to the very able paper written by Prof. Carl Christensen of Copenhagen.

The masticatory movements now remain to be investigated. They may be enumerated as follows: A depression of the mandible to allow of the introduction of a bolus of food between the teeth; its lateral swing towards the side on which the food is situated (this will be called the "pivotal side"); its elevation, bringing the teeth into contact; and its swing laterally and inwards to or a little beyond the central position, causing the cusps of the lower teeth to slide upon the upper ones, thus grinding and comminuting the

food. Of these, the only one involving contact of the teeth is the last, or the "grinding movement."

When the teeth are brought together after the lateral movement of the mandible, the buccal surfaces of the lower grinders upon the pivotal side will be outside the upper arch, having moved in the arcs of circles having the pivoted condyle as a center, the direction of which will be outwards and a little forwards, B-C, Fig. 12. On the opposite side, an arc, A, struck from the same center and running forwards from the second molar will at first run nearly parallel with the side of the arch, turning more and more inwards as it passes forwards. The teeth upon this side will,

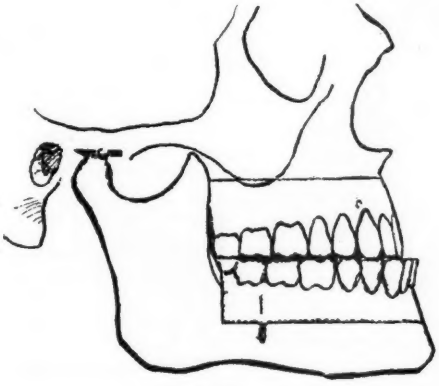


Fig. 10.

then, move nearly in line with the side of the upper arch, while those upon the pivotal side will move almost directly across those upon the corresponding side of the upper arch. The pivotal side is the one used for mastication; for the condyle is in its fossa, where it can act as a fulcrum against the stress of the temporal and masseter muscles as they elevate the mandible.

If the mandible passes the position of occlusion in its return, the grinding teeth upon the pivotal side will have a movement compounded from the two curves described, passing inwards and backwards to the occlusive position and then forwards and inwards, the center of motion passing from one condyle to the other as the mandible passes its central, or occlusive, position. If arcs, A, are struck with the condyles as centers, beginning at the mesial line

between the central incisors, their directions will be outwards and forwards. This shows the necessity for considerable clearance between the cutting edges of the upper and lower incisors in setting up artificial dentures, and the objection to the use of much overbite; for if the incisors come into contact while the grinders are separated, the plates will be dislodged.

On account of the variation in the movements of the lower teeth during lateral movements of the mandible just described, it is impossible to represent the movements of the lower teeth of both sides upon the upper ones in one engraving. Those used in the

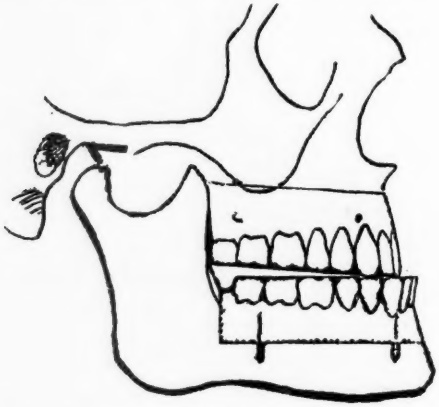


Fig. 11.

text books for so illustrating them are incorrect and misleading. The most satisfactory method for studying them is by mounting plaster casts of a well-articulated set of natural teeth in a good anatomical articulator.

So far, in the discussion of the lateral movement of the mandible, no mention has been made of the effect of the obliquity of the condyle path. All the conditions would have been fulfilled if the articulating surfaces were plane surfaces and the condyle paths were level and parallel with them. The lateral movements could then be executed, and contact of the articulating surfaces maintained. But when the oblique condyle path is brought in as a factor, the forwardly moving side of the mandible, during a lateral movement, is depressed, and, if the articulating surface is flat, con-

tact of the teeth upon both sides during a lateral movement is no longer possible. The teeth upon the pivotal side will be in contact, the others will be separated by an amount depending upon the obliquity of the condyle path. This accounts for the fact that no lateral movements are admissible when full artificial dentures are worn having a flat articulation. Only a hinge-like movement of the mandible can be used for mastication, and the lateral movement must be dispensed with. But by the introduction of a proper amount of the compensating curve, the lower molars can be made to approach the upper ones as the mandible moves forward, and

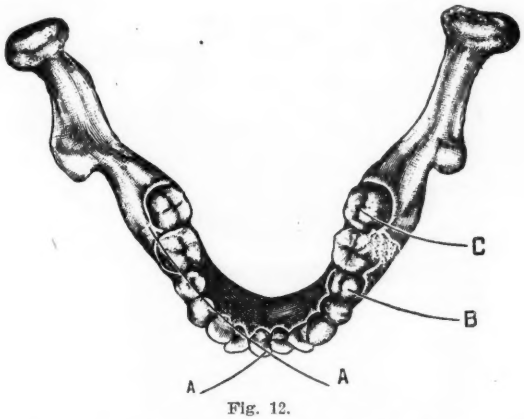


Fig. 12.

in this way contact of the teeth upon both sides of the mouth during the masticatory movements may be maintained.

To determine the character of the articulating surfaces, Prof. Christensen mounted two blocks of plaster in one of his articulators, adjusted to imitate a decided slant to the condyle movement, and then wore the blocks down by imitating the masticatory movements. The result is shown in Fig. 13. A considerable concavity will be observed in the lower block, and a corresponding convexity upon the lower surface of the upper one. As the blocks were worn to a surface which maintained contact at all points, they present an exemplification of the manner in which the masticatory surfaces of the teeth should be disposed; showing that the morsal surfaces of the lower bicuspids and molars should incline inwards, and those of the upper ones outwards; also, that the amount of inclination

should increase with the width of the arch, being less with the first bicuspids, and more with each pair of teeth, passing backwards.

The same experiment was tried in the mouth, by covering the teeth with thin shells of vulcanite, attaching soft wax to these, and pressing the wax by masticatory movements of the mandible. The result was the same.

The concavity thus produced is a direct consequence of the inclination of the joint paths of the articulator. If they were raised so as to be level, then the faces of the plaster blocks would be flat,

Fig. 13.

and they would then make uniform contact if shifted in any direction. It follows, then, that the configuration of the articulating surface of a denture depends upon the direction of the condyle paths; that a properly constructed anatomic articulator is a necessity, the joint paths of which must be set to the same inclination as the condyle paths of the patient.

There is still another condition which has never received any attention until within a few years, viz.—the position of the models in the articulator. In the instructions for the use of the Bonwill articulator, the operator was directed to place the mesial line of the front of the lower trial plate at exactly four inches from the articulator joints, Dr. Bonwill's assertion being that four inches

was the average of a large number of measurements taken from the condyles of mandibles to the mesial line between the incisors, and that the distance from the center of one condyle to the center of the other was also four inches, thus forming an imaginary equilateral triangle. It happens, however, that there is a considerable variation in these measurements; so great that the employment of the average in locating the models in the articulator will lead to serious errors.

Dr. M. H. Cryer has examined a large number of skulls, and he found that the average of the measurements of the mandibles

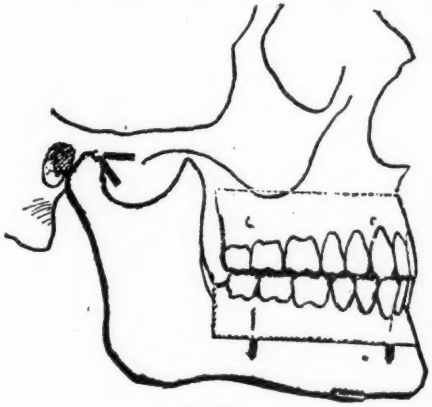


Fig. 14.

between the condyles was a little less than four inches. He also found wide variations, both in this measurement and in that from the condyles to the incisors; and in the latter measurement he found occasional differences between the two sides of the same mandible. When there was a variation in this respect, the left side was invariably the shorter. The measurements in four instances of extreme variation are appended. The intercondyloid measurement was taken from center to center of the condyles.

	Intercondyloid.	Condyle to incisors.
No. 1	3.37 inches.	4.5 inches.
No. 2	4.5 "	4.5 "
No. 3	3.95 "	4.87 "
No. 4	3.5 "	4.37 "

Two plaster models in hand, set in the Gritman articulator by

Dr. Gritman, show extremes in these measurements. As they were from living subjects, it was impossible to ascertain the dimensions as from the skulls, but as they were set in the articulators by means of the face bow, their distance from the articulator joints must have been correct. In one instance the distance from the articulator joints to the mesial line of the lower incisors was 4.62 inches. In the other 3.62 inches.

It will be seen from these instances that Dr. Bonwill's equilateral

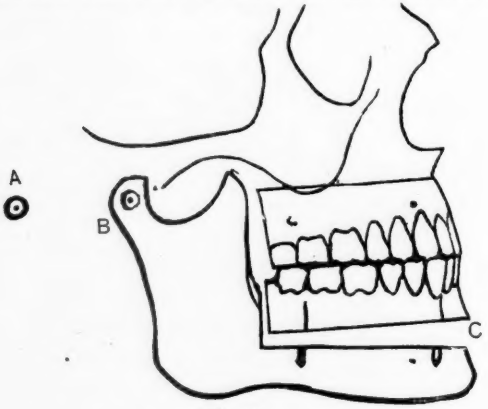


Fig. 15.

triangle theory is not always borne out by the facts. And, in fact, when artificial dentures are to be constructed, it becomes a matter of some moment that the models should be set in the articulator in the same positions, relatively to the joints, that the alveolar ridges bear to the condyles. The variations from the average are too great to allow of its employment. If this point is ignored, it will be unsafe to open or close the bite, for, unless the condition above referred to should be accidentally obtained, malocclusion will be the result when the plates are placed in the mouth.

To illustrate this fact, Fig. 14 may be supposed to represent the trial plates in the mouth, and in occlusion. Fig. 15 represents the same set, transferred to an articulator, the joint of which, A, is at a considerable distance from the condyle center, B. This is a condition which obtains with all the "plain line" articulators now in common use. The trial plates and models having been properly mounted in the articulator, so that the trial plates are in occlusion

as in the mouth, the bite is opened as seen by the opening C between the teeth and the body of the mandible. As this is done in the articulator, the point A, supposed to be the articulator joint, will be the center of motion, and the point B will have moved slightly downwards. When the teeth are transferred to the mouth, the point B assumes its original position, but the teeth, having been raised, do not articulate as they did before, as shown in Fig. 16, and the only point of contact between the two sets is at the second molars. If the error is not very great it is usually corrected

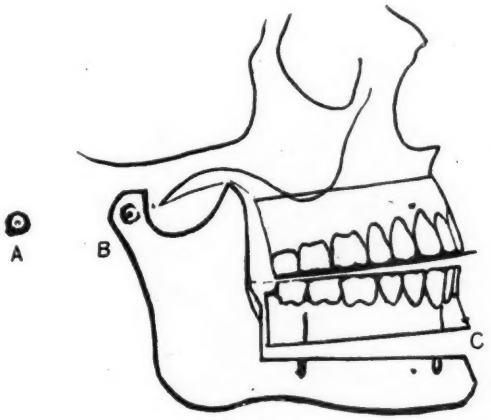


Fig. 16.

by grinding away the molars. If it is so great that this is out of the question, the reconstruction of the denture is a necessity.

This state of affairs is by no means uncommon, and, indeed, it has become a proverb among dentists that the bite should be neither opened nor closed in the articulator. A desire to obviate it was the principal inducement for the designing of the face bow, by means of which the models can be set in a correctly constructed articulator so that they will be at the same distance from its joints as are the alveolar ridges from the condyles. But it does more than this, for it not only places the models in the articulator at the correct distance, but also in the correct relations to the articulator joints in other respects. Its use has developed the fact that there are unsuspected irregularities in the positions of the alveolar ridges

and that the correct position for the model in the articulator is often asymmetrical.

Furthermore, if the positions of the models in the articulator are guessed at, as they usually are, it will be a matter of great uncertainty whether or not the correct curvature will be given to the articulating surfaces of the teeth when they are set up. These should be placed, pair by pair, the positions of each pair being tested by imitating the masticatory movements with the articulator as each pair is added. When the joint paths of the articulator are set at certain angles, the amount of compensating curve to be given to the

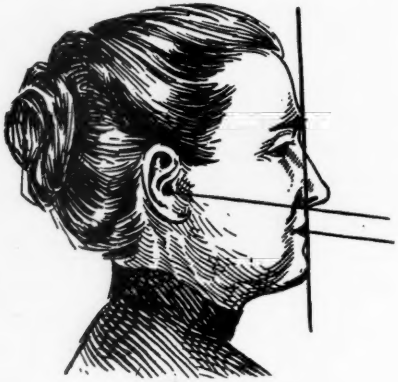


Fig. 17.

denture is thereby determined. If the rear of the upper model is set higher or lower in the articulator than the true position, the direction of the compensating curve will be changed when the plates are shifted from the articulator to the mouth.

From the facts heretofore shown, it is evident that there is at times a considerable variation in the dimensions and proportions of the jaws of those to whom artificial dentures are to be supplied; this may be so great that attainment of best results by the assumption of average dimensions of the parts in the construction of the dentures is out of the question. Each case should be treated on its merits, and an articulator should be used which is not only capable of imitating the lateral and protrusive movements of the mandible with a fair degree of accuracy, but which also has its joint slides adjustable to the ascertained angles of its condyle paths. The

directions of the condyle paths should be ascertained as well as the relative positions of the alveolar ridges to the condyles.

The face bow, by means of which the models are correctly located in the articulator, consists of a mouthpiece, to be attached to the upper trial plate, and a bow which surrounds the face and carries upon it a swiveling clamp by means of which it may be firmly attached to the mouthpiece. Upon either extremity of the bow is a sliding pointer, with a clamping nut for fastening it. The usual steps taken towards fitting the trial plates in the mouth, comprised

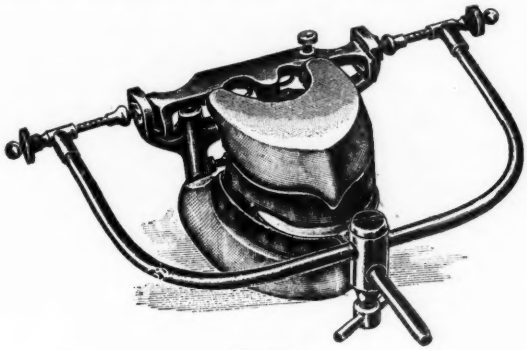


Fig. 18.

in the term "taking the bite," are all to be performed before the face bow is brought into use. In trimming the trial plates, their occlusal surfaces should be trimmed flat and to the "occlusal plane." This has been defined by Dr. Walker as a plane tangent to the cutting edges of the lower incisors and the disto-buccal cusps of the second molars. According to him, this imaginary plane forms an angle of about 75° with "the facial line" a vertical line touching the forehead, lips and chin. The angle varies slightly in different individuals, but as a starting point, a line drawn from the lowest point in the external auditory meatus to the root of the nose may be taken, as it will be very near to the correct angle. (Fig. 17.) The occlusal surfaces of the trial plates should be trimmed so that if a straight strip of thin metal were held between them, projecting for a distance from between the lips, it would be seen to be parallel with this imaginary line. (Fig. 17.) Then, after all the usual steps towards taking the bite have been concluded, the trial

plates are removed from the mouth, the fork of the mouthpiece of the face bow is heated sufficiently to melt wax and pressed into the front of the trial plate, preferably the upper one, so that it will be central therewith and parallel with the occlusal surface. This surface of the plate may be laid upon the table and the stem of the mouthpiece held parallel with the table as it is pressed into the wax.

The positions of the condyles should now be marked upon the cheeks of the patient. If the finger is placed in front of the auditory meatus, the condyle will be felt to move when the patient opens the mouth. The point to be marked is the center of the condyle; not the place where motion is felt but a little below, say a quarter of an inch. The place may be defined on either side of the face by a mark from the point of a piece of drop chalk, or by sticking a small piece of paper or court plaster on to the cheek.

The pointers at the ends of the face bow are now to be adjusted

Fig. 19.

so that they will barely pass over the cheeks of the patient, and so that their ends are equidistant from the ends of the bow. This is easily done by counting the scores upon the sliding rods. When correctly adjusted they are secured by turning their clamping nuts.

The trial plates are replaced in the mouth, the bow clamp is passed upon the stem of the mouthpiece, the pointers are placed directly upon the marks on the cheeks which denote the positions of the condyles, and the bow clamp is tightened. The plates with the face bow attached are now removed from the mouth and the face bow is attached to the articulator. To accomplish this the clamps of the pointers are loosened and the pointers pushed inward as far as they will go and the clamps again tightened. The bow will now spring over the articulator joints, the spurs on the joint screws being received into the sockets in the ends of the pointers.

Before fastening the models to their supports the latter should be brought parallel with each other by means of the adjusting screw, and they are to be regarded as being parallel with the occlusal

plane of the trial plates; thus, when the face bow is attached to the articulator the stem of its mouthpiece should be parallel with the model supports, provided it has been parallel with the occlusal line. The face bow will turn freely on the spurs by which it is attached to the articulator joints, so that its stem can easily be leveled up. When the upper model is placed in its trial plate, every point in the surface representing the alveolar ridge will be at the same radial distance from the articulator joint that the corresponding point in the alveolar ridge is from the center of the condyle. The

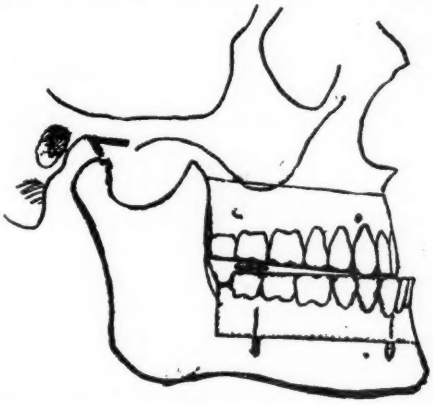


Fig. 20.

upper model is now to be secured to its model support with plaster (Fig. 18), the sleeve on the support being pushed against the body of the articulator. It will be held by the plaster and will form a shoulder, so that the model may be removed from the articulator and replaced with a certainty of its having its original position. The lower trial plate being correctly attached to the upper one, its model is placed in it and secured to its support with plaster.

It now remains to adjust the joint slides of the articulator to the angle of inclination of the condyle paths. There are two practicable methods for accomplishing this. One, devised by Dr. W. E. Walker, Dr. Campion and others, by which diagrams are made of the condyle paths. This is accomplished by the use of an instrument resembling the face bow, which is attached to the mandible; the ends of the bow carry pencils, the points of which touch the

cheeks directly over the condyles. By interposing a slip of cardboard between the pencil and cheek, a diagram is obtained showing the path of the condyle for any movement of the mandible. There is a considerable difference in the inclination of these diagrams and also in their shape; some of them being nearly straight lines, others having a decided curvature, and in these the concave side of the curve faces upward. The beginning, probably the first third of the line, shows that part of the condyle movement more particularly concerned with the sliding movement of the lower set upon the upper, and it will be noticed that this is the part of the curve having the more abrupt descent. (Fig. 19.) The angle being ascertained, it can be transferred to the articulator, provided the latter has a graduated index upon its joints.

Prof. Carl Christensen's method is entirely different. It is based

Fig. 21.

upon a fact noted by Prof. Spee. A forward and downward movement of the condyle projects the lower teeth beyond the upper ones and also induces a certain amount of separation between the two plates at the rear. It is only necessary to ascertain the amount of the separation and the amount of the forward movement of the mandible, and to duplicate these movements upon the trial plates when set in the articulator, and the joint slides of the articulator can then be readily set to the required angle. This is the more simple method of the two and is better suited for use in the dental office. Christensen's method is to place small lumps of soft wax upon the extreme ends of the lower trial plate after it has been trimmed into shape and to cause the patient to bite with the mandible projected. A scratch upon the exposed occlusal surface of the lower trial plate in front will register the amount of projection, and the lumps of wax will be compressed to show the amount of separation of the plates at the rear. (Fig. 20.) The plates can now be put upon the models in the articulator. If the joint slides are loosened so that they will turn freely and the articulator spring is cast off, the trial plates can be easily made to assume the same relative positions that they had in the mouth, and by pressing them together the joint slides will

turn and automatically assume their correct angles. But this is not so easily accomplished against the resistance of the articulator spring, and it is therefore advantageous if it can be cast off and thrown out of action at this time.

The operation is simplified by the use of the "bite gauges." (Fig. 21.) These consist of a flat, thin body, with claws upon the lower side and a conical projection above. The claws are impressed into the lower trial plate at the extreme ends of its articulating surface, so that the body of the gauges is flush with the surface. The plates are then placed in the mouth and a bite taken as before, with the mandible protruded. The cones then penetrate the wax rim of the upper plate and register the amount of separation of the two plates, and also the amount which the lower one projects beyond the upper one. One advantage in using the bite gauges is that this part of the operation may be done before using the face bow, as they can be easily detached and replaced; so they may be laid away until the models are set in the articulator and the joint slides then adjusted. The whole matter, so far as it involves the attendance of the patient, can thus be disposed of at one sitting and in a very short time.

It will be remembered that the condyle path is usually more or less curved and that the beginning is the more abrupt portion of the curve. If the mandible is fully projected and the articulator slides set accordingly they will not give the angle of the abrupt portion of the condyle path, but that of a straight line connecting its two ends. It is better, therefore, if the mandible is not fully projected, and only the beginning of the condyle path is taken into account. In other words, to use the incisive, not the protrusive bite. (See Fig. 19.)

The articulator being properly adjusted, the teeth are now to be arranged. As they are put up by the manufacturers, the upper and lower sets do not always correspond in width. In the sets of 28, the lower incisors and cuspids are very often too wide. It is better in such a case to exchange them for narrower ones rather than to ruin their shapes by grinding. In any event, the arrangement of the other teeth should not be disturbed.

In setting up the teeth the example afforded by the eruption of the natural teeth may well be followed. When the first molars are erupted the distal part of the upper overhangs the lower one

and forms a guide for the eruption of the second lower molar. And each pair as it appears finds its place by coming into contact with its opponent, already erupted, and by lateral pressure of its opponent against the inclined surfaces of its cusps during the constant movements of the mandible.

The upper and lower teeth should be of such a relative size that when they are set up the center of the lower second bicuspid will come directly below the space between the upper bicuspids. Set up the upper ten front teeth, trying them in the mouth and arranging them as artistically as possible. Then set up the two lower second bicuspids, to come into the interspaces between the upper ones. Add one tooth at a time upon each side and test the articulation by lateral movements of the lower section of the articulator, arranging them so that the additions will not prevent the teeth already arranged from articulating, so that when the lower teeth are thrown forward the cusps of the molars will touch while the incisors are in contact; and also when a lateral movement is made the molars of one side will touch at the same time as the bicuspids of the other. Only a little "overbite" of the incisors is admissible, too much of it preventing proper contact of the grinders at the time the edges of the incisors are brought together. There is no objection to grinding the cusps or deepening the sulci of the teeth, if it is thought advisable.

Attention is also called to what has already been said concerning the convexity of the upper occlusal surface and the concavity of the lower one. The lower teeth should therefore lean inward and the upper ones outward to bring them into the correct positions.

After the teeth are arranged the plates should be tried in the mouth of the patient. So far as articulation is concerned there is but little chance of there being any alterations required, but a trial, which will give assurance, is better than an uncertainty. But some minor changes in the esthetic way, looking to a more natural appearance, will often be suggested by engaging the patient in conversation and watching the play of the lips and features.

Assurance may also be had that the mandible was not projected when the bite was taken. If any malocclusion or other fault is apparent it can be corrected in the mouth and one of the models afterward reset to correct it in the articulator. But if due care has been exercised in all the preliminary steps, as heretofore detailed, the occasion for changes will seldom occur.—*Dentist's Magazine.*

REPORT OF A CASE OF SMALL SPINDLE-CELL SARCOMA OF THE JAW. By William T. S. Dodds, M.D. Mrs. W——, aged twenty, of Indianapolis, presented herself at my office in August, 1906, complaining of a swelling and inflammation in the lower jaw on the left side. This swelling had existed for some six weeks, and had its origin, according to the patient, in the third molar, which could not erupt because of insufficient room in the angle of the jaw according to her dentist.

The family history of the patient was bad, her father and mother both being confirmed alcoholics, and probably other dissipations and depravities existing which may have had some influence upon the physical condition of the patient. This history was obtained in an indefinite way, because the girl had been separated from her parents early in childhood by the humane society and placed in the home for girls.

The patient had not been ill, and was in a strong, robust physical condition, with every appearance of perfect health. She had no blemishes nor marks of hereditary disease evident upon her at any time. She had had the usual diseases of childhood from which she had made good recoveries.

The present illness began early in July, 1906, with a slight swelling at the angle of the jaw, accompanied by an attempt of the third molar to appear. This persisted for some two or three weeks, when she consulted with a dentist, who advised her that the space between the second molar and the angle of the jaw was insufficient to permit the eruption of the third molar. He advised her to have the second molar removed, which would then give space for the eruption of the third molar. This was done, without any relief of the swelling or disturbance of the local area. Soon after the withdrawal of the second molar she consulted me, and I sent her to another dentist, because the conditions present seemed to be purely in the field of dentistry. This dentist, upon examination, found that the alveolar process surrounding the third molar was necrosed and granulating tissue and pus formation evidently had dislodged the third molar from its process. This tooth was found floating in the loose tissue surrounding the angle of the jaw. In addition to this, he observed that the remaining molars

and bicuspids were diseased in practically the same manner as the third molar. After consultation he removed these in the hope of effecting a cure.

At this time the upper third molar and second molar began to exhibit the same symptoms as those noted in the lower jaw, and these teeth were subsequently removed, which presented the real

FIG. 1.

PHOTOGRAPH OF THE CASE TAKEN 12 HOURS BEFORE DEATH.

The light spot showing in the center of the mouth is not the togue. It is a portion of the tumor, which has filled the mouth and crowded the tongue backward into the throat.

pathologic conditions. During this time, which covered a period of two or three weeks, the tumor at the angle of the jaw continued to grow with a certain amount of infiltration of the cheek, tonsilar and peritonsilar areas, and the muscular fibrous tissue at the base of the tongue. The tumor had ceased to be painful after the removal of the lower third molar, and now interfered with the patient only in the operation of mastication.

At this time the tumor had progressed to such a size that the encroachment upon the tongue and the protrusion between the

jaws into the mouth had caused some considerable annoyance, and it was decided to remove some portions of these and establish drainage, because considerable pus and sloughing had taken place. The odor from the secretion was excessively foul, and the discharges were of a prune juice character. Persistent, effectual antiseptic douching of the mouth with proper medication failed to retard or relieve the condition, and a surgical operation was deemed advisable.

Dr. E. D. Clark was called in consultation, and we opened what we supposed to be an extensive abscess along the angle and lower quarter of the left jaw. This was without avail, because, in the place of an extensive abscess formation we found only succulent tissue very extensively supplied with blood vessels. No abscess; no pus could be found anywhere along the angle of the jaw, and the only result obtained at this time was temporary relief from pressure. In two or three days we sent the patient to St. Vincent's Hospital, where an operation was performed which included currettment of the antrum of Highmore of the cheek and lower jaw, peritonsilar tissue and tongue. At this time sections of the tissue were obtained and microscopically examined, demonstrating the presence of a malignant growth. The first tissue obtained was more particularly that of a necrotic character, without any general cellular structure, and we concluded that we had to deal with a cancrum orum, and so informed our patient. This curettment resulted in a great amelioration of the patient's symptoms, and conditions approached those of normal with regard to temperature, pulse and general expression of the symptoms. We expected to see conditions greatly improved and our patient get well. This, however, was soon found impossible because of the rapid recurrence of the growth along the entire line of operative procedure, with apparently more violence and rapidity than before. Another thing became apparent with the recurrence of this growth, and that was a change in the appearance of the tumor formation. Heretofore the mass was made up of a soft, succulent material resembling an abscess, but this time the tissue was firm, hard and indurated.

Sections of this recurrent mass were obtained and microscopic

examinations proved them to be composed of a small spindle-cell sarcoma which was greatly infected.

At this time a great abscess developed between the cheek proper and this tumor which endangered the life of the patient from sepsis. Evacuation of the abscess was followed by a prompt improvement in the patient's condition. After this, no sepsis appeared, and no great quantity of pus was evident during the remaining time.

A few words with regard to the pathology of this tumor for-

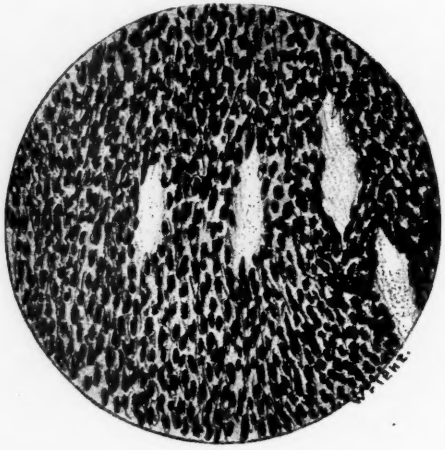


FIG. 2.

⅔ objective showing richness of cells and small amount of connective tissue.

mation upon the jaw, the result of irritation of diseased teeth, or constantly irritating substance in the alveolar process. Early pathologists classified this epulis as *recurrent fibromata* without any particular reference to malignancy. Pathologists recognize, at the present time, that these epulæ are of benign and malignant nature. The malignant epulæ should be classed with the sarcomata and not in a distinct classification by themselves.

This tumor presented the characteristic grayish white fibrilated surface when examined in section, which is characteristic of sarcoma. The malignant epulæ are more vascular and more suc-

culent than are sarcomata. These large, irregular shaped cells which make up the tumor formation in epulis are probably the cells which compose the capillaries and blood vessels proliferating this fibrous structure. The tissue in epulis is not so distinctly embryonic as that of sarcoma. A glance at the sections which accompany this report will immediately classify this tumor as a spindle-cell sarcoma. More questions might be raised with regard to the number of round cells, and an objection as to the clear classification with the spindle-cell varieties. It is difficult to say

FIG. 3.

⅙ objective. Same as Fig. 2.

whether or not these are round cells or only cross sections of the spindle cells which would give the appearance of a mixed cell sarcoma. Indeed, the classification with regard to the shape of the cells is more or less arbitrary and not much importance is attached thereto.

This case proves the observation, which is frequently noted, that dentists, as a rule, do not appreciate the different varieties of tumor formations in the mouth from the gross appearance of the tumor in its incipiency. It is of great importance, in this class of tumors particularly, that the differentiation should be made

early in the disease. Of course, numerous cases are seen by dentists of certain peculiar tumor formations in the mouth which are the result purely of inflammation, and rapidly succumb to the ordinary dental manipulations. This may be one reason for the apparent ignorance with regard to the gross appearance of tumors situated in the mouth.

A malignant tumor in its incipiency is practically always devoid of inflammation and of inflammatory products. An ordinary tumor, the result of an abscess at the root of the tooth, or the result of some infection of the teeth, is always accompanied by pain, swelling and inflammation. This, of course, differentiates grossly a benign from a malignant tumor. However, there are certain benign tumors which appear in the mouth that never assume a malignant state, and could not be differentiated by this method, but such tumors do not grow rapidly and do not encroach upon, nor grow into other tissue than that from which they spring.

A tumor situated in the mouth, or more particularly in the gum, alveolar process, or jaw bones, which is not painful, is not accompanied by inflammation, and which grows rapidly, should be observed with the utmost suspicion because such tumors are, as a rule, malignant. The irritation which may accompany the eruption of a tooth, causes a swelling and inflammation which is uniform and regular, while the swelling of tumor formation, the result of a malignant growth, is, as a rule, not so regular and uniform, but appears nodular and infiltrating.

Another gross appearance with regard to tumor formations, due to sepsis, is that almost immediately upon the development of such a tumor formation, we have a secondary inflammation of the submaxillary glands and the glandular structure around the base of the tongue, and down the cervical lymphatics. In the sarcomas we do not have such glandular inflammation early, and when this inflammation takes place it is a long time after the real nature of the process becomes apparent to the casual observer. To be sure, it often requires a microscopic examination of the tissue to demonstrate its true nature, but this should not be withheld until the patient's life is in danger by the rapid encroachment of the malignant growth upon the surrounding organs.

The prevalence with which sarcoma springs from the perios-

teum of the alveolar process and the surrounding connective tissue should stimulate the dentist to be extremely suspicious of any tumors discovered in the mouth, where pus cannot be accurately and absolutely demonstrated. Especially should their suspicions be aroused if the tumor manifests in this area without pain, without inflammation, and particularly without fever; because no tumor formation, the result of sepsis, will exist long in the mouth without some manifestation, as above described. The duty of the dentist, in such cases as this, is to obtain sections of the tissue for microscopic diagnosis and demonstrate beyond any reasonable doubt the existence of the condition before any chances are taken with the patient.

The girl's life might have been saved had the tumor been recognized as a malignant growth early in July, and not have been permitted to develop into such a horrible, disfiguring, mutilating, fatal affair.

The photograph which accompanies this article was taken twelve hours before the patient died from hemorrhage, the latter being due to a sloughing of the tumor in the region of the carotid arteries. In conclusion, I would call your attention to three points in differential diagnosis.

First. That any tumor which presents itself in the mouth, of rapid growth, being devoid of inflammation, pain and pus, should be immediately examined under the microscope to determine its nature.

Second. If the tumor is demonstrated to be malignant, it should be removed by a radical surgical operation, thereby curing the patient and saving discredit upon the dental and medical professions.

Third. That sarcoma and epulæ should be classified under the same category of tumor formations, as a rule.—*Items of Interest.*

THE DIAGNOSIS AND TREATMENT OF ANTRAL SUPPURATION. By Cornelius G. Coakley, M.D., New York City. The dental surgeon and rhinologist have for some years given considerable study to the etiology, diagnosis, and treatment of suppuration in the maxillary sinus. That I am not as familiar with

the excellent work of the former as with that of the latter is to me a matter of much regret. In rhinologic literature one only occasionally meets with a reference to the writings of dental surgeons. The views which I put forth this evening are those which have been acquired from the literature—mainly rhinologic—that has been accessible to me, together with my own personal experience in observing the disease.

ETIOLOGY.

On the subject of the etiology of antral suppuration, your clinical experience and ours will probably differ materially.

Acute suppuration. The unfortunate victim of the toothache naturally seeks relief at the hands of his dentist. He is the one who will diagnose and treat a large percentage of the acute cases of dental origin.

Direct infection of the antrum by pus breaking through the tip of a diseased root and penetrating the cavity of the antrum, or by extension through necrosis of the intervening layer of bone, or by extension from dental or pericemental suppuration through the rich anastomosis shown by Strubell (*Monatsschrift für Ohrenheilkunde,* June, 1904) to exist in the blood vessels supplying the teeth, pericemental structures, and mucosa of the antrum—such are the frequent causes of acute suppuration as seen by dentists. Personally, I see but few of these cases, on an average not over half a dozen a year.

The acute cases of antral suppuration coming under my observation are mostly of nasal origin, secondary to acute inflammation of the nasal mucosa, such as one meets with in severe acute rhinitis, especially of the influenzal type. In addition to the general facial neuralgia experienced by these patients, they often have pain in one or more of the teeth of the upper jaw on the affected side. When such pain is complained of, I always examine the teeth. My knowledge of disease conditions in the teeth is comparatively superficial, so that if I am in doubt as to the cause of the suppuration the patient is referred to his dentist for an expert opinion as to whether they are the cause of the disease.

Chronic suppuration. Although it is comparatively easy to determine in acute cases the dental or nasal origin of antral suppuration, in the chronic cases the disease has usually existed for so

long a time that patients forget the train of symptoms which occurred at the onset, by which we might have conjectured which of these two sources was the probable one in any individual instance.

The fact that a patient with chronic suppuration in an antrum has, or has had, diseased teeth in the maxilla of that side, is not to my mind conclusive evidence that those teeth caused the disease. It is very common to find badly diseased teeth, devitalized teeth, inflamed and ulcerating gums, dento-alveolar abscesses, and swelling of the face, with pus-formation between the periosteum and bone of the anterior surface of the maxilla, without any disease of the maxillary sinus. Tilley states (*Laryngoscope,* February, 1904, p. 102): "In the past ten years, during which I have seen at least three hundred cases of antral abscess, I have met with only one patient—a girl aged twelve—in whom the teeth were quite healthy." To my mind this merely proves how seldom one finds a jaw in which the teeth have been or are absolutely healthy. Tilley does not state how many of the 299 of these 300 cases were dental in origin, but leaves the reader to infer that the dental origin is more frequent than most rhinologists believe.

A most excellent review of the literature on the etiology—dental and nasal—of antral suppuration is given by my friend, Dr. Geo. L. Richards, in the *International Dental Journal,* February, 1905. How widely opinions differ may be judged from these quotations: B. Fraenkel, from clinical experience, states that "In by far the larger number of cases disease of the teeth and alveoli was the causative factor." Krause considered that "Carious teeth do not bring about empyema."

The clinical histories of my private patients have not been kept in such a way that I can determine the proportion of probable nasal or dental origin. My impression is that less than twenty per cent could be ascribed to dental causes.

It may be interesting to note that at the University and Bellevue Hospital Medical College clinic for diseases of the nose and throat, there were records kept of 2,340 new patients between October 1, 1905, and October 1, 1906. Of these, 59—practically 2½ per cent—had antrum suppuration, often combined with suppuration in the other sinuses. As we had no dental surgeon to whom to

refer these, none received any treatment of the teeth, and at the present time all but four of the recent cases have been cured, we believe, without attention to the teeth. Had diseased teeth still in the mouths of the patients produced the condition, it is unlikely that such good results would have been attained.

DIAGNOSIS.

The diagnosis of antral suppuration may best be divided into the acute and chronic types.

Acute type. In the acute type two prominent symptoms are complained of—(1) pain, and (2) nasal catarrh. The pain may be limited to the region of the antrum and be most marked in the infraorbital region near the nose, or radiate to the forehead, the eye, or the temporal and mastoid regions. One or more teeth in the maxilla—the second bicuspid or first or second molar—often ache, and usually do in cases of antral suppuration of dental origin. The fact that a tooth looks healthy to an inexperienced eye is no evidence that it may not be diseased at its root, and thus be the cause of the disease.

The discharge from the nose is a purulent one, and most frequently odorless. At times there is an intensely foul odor to the discharge, noticeable to the patient as well as to others. At one time it was considered that a foul odor in the discharge from an antrum invariably denoted a dental cause for the suppuration. The odor is due to the presence of various putrefactive bacteria, and as these are nearly always found in dental suppuration, the inference was that they gained access to the antrum along with the infecting bacteria. While I am always strongly suspicious of a dental origin in an acute antral suppuration accompanied by odor, my suspicions have not always been well founded. In one case, presumably vomited material entered the antrum while the patient was in the Trendelenberg position subsequent to extirpation of the larynx and caused an acute suppuration, with an exceedingly foul ammoniacal odor. In other cases, of undoubted nasal origin, a foul odor was found when the disease had lasted only a week. In such cases putrefactive bacteria have gained access to the antrum through the nose concomitantly with or soon after the entrance of the pathogenic bacteria. At night the discharge flows from the nose into the nasopharynx, and is swallowed or hawked

down, partially dried, from the nasopharynx in the morning. Occasionally the anatomic structure of the nose is such that *all* the discharge, even when the patient is in the upright position, passes backward into the pharynx.

Swelling of the face over the antrum is an occasional symptom, and in my experience has been seen more frequently in cases of dental than in those of nasal origin. In the former the swelling begins in the lower region of the face, near the alveolus. It may be limited to this region or extend upward until it involves the loose connective tissue below the orbit, whence it may pass around the inner and outer canthi to the upper lid and even to the lower portion of the forehead, effectually closing the eye on that side. We have, however, seen such a swelling when the pus was entirely external to the antrum, between the periosteum and the bone. In nasal cases the swelling and edema usually appear in the upper region of the antrum and lower lid, and seldom spread down to the alveolus, unless, as in a syphilitic case, a gumma results in necrosis of the anterior wall, with sinus formation near the floor.

In acute cases there is often a rise of a few degrees in temperature, an acceleration of the pulse-rate, a coated tongue, foul breath, and all the symptoms of a mild septic intoxication.

Examination: The examination of a suspected case of antral disease should include a careful examination of the teeth and nasal cavity by transillumination and skiagraphy, and if these give presumptive evidence, irrigation of the cavity under proper aseptic precautions should be performed.

Tapping the bicuspids and molars with a metallic instrument is nearly always accompanied by pain in cases of acute antral suppuration. Often some one tooth is more sensitive than the others. If such be the case, it should be most carefully examined. I have many times failed to detect any disease in such a sensitive tooth, and after irrigating the sinus and relieving the tension, have found that all the sensitiveness had ceased. My belief is that in these cases the roots of such a tooth are separated from the antrum by a thinner layer of bone than usual, and that the pressure within the cavity and the inflamed nerve and bone give rise to an undue sensitiveness in a healthy or even a carious tooth. One of the sensitive teeth is often found to be carious. On such a patient be-

ing referred to his dentist, the report has usually been that the tooth had a superficial caries, which, of course, needed attention, but probably did not cause the disease in the sinus.

On the other hand, the history of a tooth grumbling for a few days, then aching, followed by a slight swelling of the alveolus, and later a purulent discharge from the nose, would lead one most certainly to expect to find a dental cause for the antral disease. In such a case, too, it may be found that at least three teeth are sensitive to tapping—the one really diseased and the immediate neighbor on each side of it. In two cases with this history, the crowns of all the teeth, apart from having a few fillings, appeared to be healthy. These patients' dentists advised the removal of teeth, at the root of which in each case was found a roundish mass, the size of a French pea, of what looked to me like granulation tissue. There was the smallest amount of secretion present around the mass, but a fine probe could be passed directly through the root-socket into the antrum.

Examination of the nasal cavity usually shows pus coming from beneath the anterior end of the middle turbinate. The entire nasal cavity may be filled with the secretion; if the patient has recently blown his nose, none may be seen for a few minutes. In case no pus is seen anteriorly, an examination of the posterior nares may show a streak of pus flowing down over the upper surface of the posterior end of the inferior turbinate. The mucosa of the nose is always more or less swollen. In cases of nasal origin there is apt to be a more general congestion of the mucosa, while in some of those of dental origin I have noticed the greatest swelling in the mucosa of the outer wall, that of the septum not being involved to so great an extent.

I have only met with one case of suppuration of the maxillary sinus—of course not considering as such suppuration of a dental cyst in the antrum, in which the pus did not discharge from the antrum into the nose.

With the presence of pus in the nose I invariably transilluminate the antrum. I do not know how frequently dentists resort to this procedure, but I wish to urge it upon you very strongly. In sinus disease of dental origin you can use it to great advantage, not only as a diagnostic aid, but as a means of determining the

progress of your case while under treatment. To be effectual, transillumination must be done in an absolutely dark room, and there must be a means of regulating the amount of light used in each case in proportion to the thickness of the cranium of the individual. For the latter purpose a lamp of from fifteen to twenty volts' capacity should be used, and the current controlled by a rheostat, so that the light may be increased or diminished at will. Normal heads often show slight variation in the illumination of the two antra. With practice this difference may be gradually learned, and all darkening in an antrum beyond this variation should be investigated. I have often been able by transillumination alone to seek and find antral suppuration, where, otherwise, from the history or nasal examination, it might have remained unsuspected. True, I have occasionally been led to puncture an antrum where the shadow seemed to indicate pus and have found none, but as the procedure, when carefully and aseptically performed, is neither very painful nor dangerous, no harm results.

The typical illumination in unilateral disease of a maxillary sinus once seen cannot be forgotten. The whole of the superior maxillary region of the healthy side is well illuminated, and when the eyelids are separated the pupil on that side can be seen to be well illuminated. By contrast, the illumination on the diseased side is poorer, especially in the upper portion of the maxillary region, where a considerable shadow is observed, and in addition there is usually an absence of illumination of the pupil on the affected side. That the shadow is not due only to the pus in the antrum may be determined very readily by again transilluminating a patient after irrigating the antrum. It will then be found that there is a diminution in the depth of the shadow, but still a marked difference between the diseased and the healthy side. This is due to the increased vascularity and thickening of the mucous membrane of the antrum and its bony walls. When as a result of treatment the illumination of the two sides of the face approaches an equal brilliancy, one can be sure that the inflammatory process is subsiding and the treatment efficacious. Of course, to properly judge of this progress one must be sure to use the same degree of illumination at each visit, hence another reason for

having a graduated rheostat for knowing and recording the voltage used for the illumination.

Transillumination is apt to be misleading in the presence of infiltration of the tissues of the cheek external to the antrum. The shadow is quite like that in antral suppuration—except that it is lower—but there may be a faint pupil illumination. In children under approximately twelve years of age, transillumination, owing to the imperfectly developed antra, has been found of little or no value.

Skiagraphy. During the past few years much help has been derived by the dentist and the rhinologist from the knowledge obtained by a negative exposed to the X-ray passing through the alveolar process, or anteroposteriorly through the head. By the former method the dentist can determine the size, shape, and condition of tooth-roots—filled or otherwise—the presence of misplaced or unerupted teeth, spicule of bone fractured in extracting a tooth, and retained portions of a root broken in the process of extraction. Any of these conditions may be a factor in causing the maxillary sinusitis, and could not so easily have been detected without the use of the X-ray. The rhinologist, by taking an anteroposterior picture of the head, may discover an ethmoiditis or frontal sinusitis draining into the antrum as a cause of the failure to cure what seemed a simple inflammation of the maxillary sinus.

Irrigation. However presumptive may seem any or all combined of the above symptoms and signs of antral suppuration, there is but one sure method of diagnosis, namely, irrigation of the cavity and the washing out of the secretion. There are many routes by which an antrum may be irrigated, according to the circumstances of the case:

(1) Through a root-socket after extraction of a tooth. This method of course should only be considered in the case of a tooth so badly diseased as to require extraction.

(2) Through the alveolar process where a tooth has previously been extracted. (A difficult method, owing to atrophy of the process and liability to miss the antrum and penetrate the cheek or hard palate; not considered good surgery by most rhinologists.)

(3) Puncturing of the anterior wall of the antrum in the

canine fossa, after cocainization. Rhinologists almost never employ this method.

(4) Cocainization of the middle meatus of the nose, and with a suitably bent cannula searching for and irrigating through the normal ostium of the sinus. This method is the one selected by a few rhinologists, but on account of the pain and difficulty in locating the ostium I seldom employ it.

(5) The method chosen by the majority of rhinologists—cocainization beneath the inferior turbinate and passing a trocar through the outer wall of the nose beneath the inferior turbinate into the antrum. The outer wall of the nose, to about one and one-quarter to one and one-half inches within the nostril, is usually quite thin, readily punctured, and practically painless when the tissues are properly cocainized. All instruments should be thoroughly sterilized by boiling, the nose first douched free from all pus, and only sterilized normal saline solution used for purposes of irrigating the antrum. The fluid injected through the cannula with a syringe, enters the lower part of the antrum and emerges—mixed with whatever secretion is contained in the cavity—at the ostium maxillare, and when the head is inclined downward the mixed secretion falls into a pus-basin held below the chin. Irrigation always causes pain in the teeth whenever it is necessary to use much force to wash out an antrum.

I know of but two sources of error in making the diagnosis by the puncture method: (a) That the expelled secretion may really come from the nasal cavities and not the antrum. This should be guarded against by inspecting the nose and determining that no secretion lurks there after douching. (b) That the antrum may be bifid, the trocar entering only the healthy cavity. This is a rare condition, illustrated by the following case which I once treated:

Mrs. B., age sixty-seven. Foul-smelling, purulent discharge from right nasal cavity, of three years' standing. Pus seen, on anterior rhinoscopy, coming from middle meatus. Transillumination—right antrum very dark, no pupil illumination, left antrum and pupil well illumined. The upper first molar was the only tooth remaining on the right side, and on the left side the lateral incisor had ached considerably, was loose, and the gum had re-

ceded very much. I punctured the right antrum through the inferior meatus, and the return fluid contained thin, granular, very fetid pus. Her dentist advised extraction, as the tooth was a devitalized one, and opening the antrum through the root-socket. Gas anesthesia and tooth-extraction by Dr. Hasbrouck. The probe did not pass through the alveolus into the antrum. With a trocar I bored into the antrum through about an eighth of an inch of bone. When the patient returned to consciousness I irrigated the antrum through that opening, but the return fluid was only slightly bloody and contained no pus. I packed iodoform gauze into the antrum through the opening. On each of the two succeeding days the gauze was removed and the antrum irrigated, but no pus was evacuated. In the nose the presence of pus was still evident.

The antrum was again punctured through the inferior meatus, and this time a foul-smelling pus came away. A wide opening was made through the inferior meatus and the case was cured. A probe passed through the root-socket into the antrum and another passed through the nasal opening did not meet. In this case there was evidently a complete septum dividing the antrum into two distinct cavities, each having its own opening into the nose.

Chronic stage. Whether originally of dental or nasal origin, chronic suppuration of the antrum is practically always found as a sequela of an acute suppuration which was either not recognized and did not spontaneously get well, or else was an acute case which in spite of the treatment given had continued to discharge. Rhinologists recognize a type of this disease in which there is little pathologic change in the mucosa of the antrum, although the cavity is filled with pus. These cases they call "reservoir" antra. The pus which they contain comes from the ethmoidal cells or frontal sinus.

There is but one constant symptom in chronic disease of the antra, viz., a purulent rhinitis—"catarrh," as the patient so frequently designates it. This discharge varies considerably in amount at different times. When increased, these patients say they have "taken cold," which they do quite frequently. There may or may not be an odor to the discharge, but the proportion of cases in which there is a foul-smelling discharge is much greater than in the acute cases. Fortunately the patients them-

selves are seldom aware of this odor, for their sense of smell is blunted for that particular one, although often keen for all others. The cause of the odor is discussed under the acute cases.

A dull headache or heaviness may at times be experienced, but seldom of the neuralgic type, as in acute cases. The teeth seldom give pain, for if a tooth was originally at fault, the local disease has either subsided spontaneously or been treated and cured by a dentist, or the offending member has been extracted.

The rhinologist diagnoses chronic antrum suppuration as the result of an examination of the nose conducted as described in connection with the acute cases. Owing to the occasional intermittent character of the discharge from the antrum into the nose, and the frequent use these patients make of the nasal douche, it occasionally happens that antral suppuration is overlooked by the rhinologist on the patient's first visit to the office. This oversight would be made less frequently if we all employed transillumination of the antra as a routine practice in patients suffering from "chronic catarrh." There is one condition which I have sometimes noticed in chronic suppuration that is less frequently seen in acute cases—viz., a congestion of the mucous membrane and dilatation of the veins of the gingivo-buccal fold on the affected side.

It would interest me very much to know whether there is any local condition of the teeth, other than manifest suppuration in a tooth-pulp, by which a dental surgeon's attention is directed to the antrum in chronic suppuration.

PROGNOSIS.

The prognosis in *acute* maxillary sinusitis is good, provided the etiologic factor be removed and the proper drainage afforded. Undoubtedly, many of the milder cases of nasal origin recover spontaneously without treatment and even without a diagnosis having been made. Whether the same may be said of those of dental origin I do not know. Probably all of the chronic cases we see began as acute cases months or years before, and might have been cured had they been recognized early and properly treated. The antra are not so closely related to the brain as are the ethmoid cells and frontal sinuses, so the danger to life is seldom great.

There is one danger in failing to recognize acute suppuration in the antrum and allowing the process to become chronic which is perhaps not realized. I refer to the fact that secondary involvement of the ethmoidal cells, the frontal sinuses, and probably, later, the sphenoid as well, may occur. Rhinologists are well aware that pus from the upper cell region, ethmoid and frontal, may infect an antrum, but I am sure the reverse process has occurred in at least the following three of my cases, all of dental origin:

Mr. B., age thirty-seven. Tooth protruded into the antrum; tooth was extracted; small hole in alveolus and occasional irrigation for two and one-half years. When I saw him the frontal and ethmoidal cells on the same side were suppurating.

Dr. Van W., age twenty-eight. Tooth protruded into the antrum; tooth extracted; no irrigation. Pus flowed from the alveolus for about two weeks and then the discharge ceased. Nasal catarrh with foul odor occurred for one year on the same side as the antrum. Finally there was intense frontal pain on the same side. The frontal and ethmoidal cells were involved; there was exophthalmos. Radical operation on frontal, ethmoid, and antrum.

Mrs. B., age fifty-six. An infected tooth had been cleaned and filled, but upon its again becoming infected a nasal discharge followed. The filling was removed and the canal washed out daily for two weeks. Pain and swelling occurred over the maxilla with foul nasal discharge. The tooth was extracted and the antrum washed out through the alveolus. Periodic closing and opening of the aperture in the alveolus was effected. One year later she was referred to me for antrum treatment; found frontal and ethmoidal cells also involved. Radical operation.

The probable method of extension in these cases was through the infection first of the ethmoid cells, many of which are separated from the upper inner portion of the antrum by a very thin partition.

The prognosis in *chronic* cases should be more guarded. A large proportion may be cured by the simpler methods of drainage, but every now and then I meet with a case that only a most radical operation can cure.

TREATMENT.

In speaking of the treatment of antral suppuration I will confine myself to dealing simply with cases in which the teeth are the presumptive cause. I will begin by asking a question: What do dental surgeons advise with reference to a tooth which has been so diseased as directly or indirectly to infect an antrum? Should the tooth be immediately extracted, or is it possible to relieve the patient of the acute symptoms of the sinus disease, and then to so treat the tooth that it may remain a useful member and free from reasonable danger of reinfecting the antrum?

Up to the present time I have invariably had the diseased tooth extracted, often upon the advice of the patient's dentist. Unfortunately, it has sometimes been difficult to determine which tooth was the offending member, and some of my patients have had a sound tooth extracted, and later on the diseased one.

Once the exciting cause is removed there is but one plan of treatment in the case of an abscess in the antrum, just as in abscesses elsewhere in the body, viz., *good, efficient drainage.* Let us be guided by sound surgical principles and procedures. No modern surgeon would make a pinhole opening in a large abscess cavity. He would open it widely at a point where he can get the best drainage, and in a few days the reparative process would result in a cure. We all know that suppuration in the antrum is not exactly analogous to an abscess, for we have a secreting mucous membrane inclosed in a hollow bony cavity. The inflammation causes a considerable edema and infiltration in the mucous membrane, with excessive secretion from the glands and exudation from the blood-vessels and lymphatics, all of which make up the discharge. The normal antrum is kept dry by the current of air which enters the nose absorbing the moisture as fast as it is secreted. A diseased antrum cannot be so affected by the inspired air-current for two reasons: First, there is always a swelling of the mucosa of the middle turbinate and outer wall of the nose in the region of the ostium that prevents the adequate access of air to that region, and, second, the swelling of the mucosa within the antrum virtually blocks the ostium to all but the secretion in the antrum, which is forced out under slight or

considerable pressure. Drainage and restoration of the normal ventilation are the two objects to be sought for.

In the early days of rhinology, as in other branches of surgery, many methods of operating were advocated which in later years have been supplanted by better ones.

One of the earliest methods of treating antral disease was by extracting a tooth or boring through an empty tooth-socket and inserting a drainage tube of rubber or metal. Many cases have been cured in this way. I have known of cases wearing such a tube for years. I formerly employed it, but have discarded it. In my opinion an alveolar opening is only permissible in the very acute cases when a tooth evidently the cause of the trouble has been extracted. The opening through the alveolus should be of the full diameter of the crown of the extracted tooth, and no packing used except aseptic gauze at meal-times to prevent the entrance of food particles into the antrum. The opening, of course, closes rapidly, but if the case is not healed in a few days I would advise operating by the nasal route. Most rhinologists and dental surgeons, when operating through the alveoli, make too small an opening to give good drainage. They inject all sorts of antiseptic fluids into the antrum. These do not kill the bacteria, and only irritate, inflame, and tend to keep up the disease process. If irrigation is to be used, let it be of normal saline solution. The insertion of a drainage tube of any sort is a delusion on the part of patient and physician. I never saw a drainage tube placed in an antrum through such an opening that did the work effectually. The tube, if cut off level with the floor of the antrum, is quickly grown over at its upper end with the edematous mucous membrane of the antrum, and no drainage results. To overcome this it is allowed to project one-quarter of an inch or more above the floor of the cavity, and then, of course, it does not drain. Granulations always form around the tube, as can be easily demonstrated whenever the latter is removed and the cavity inspected. The proportion of acute cases treated in this way that go on secreting for weeks and months and finally become chronic is, I feel sure, greater than that treated by any other method.

The canine fossa route is a close second to the alveolar for

unsatisfactory results in treatment. It has the merit that it can be made under cocain anesthesia with little or no pain, but the same objection as to imperfect tube drainage is present.

The nasal route for approaching a diseased antrum has been to me the most satisfactory method of treating not only the acute but also the chronic cases. I cannot recall a single acute case—and by such I mean all cases the history of which points to a discharge for a period of a few days up to a month or six weeks—that has not been speedily cured by this method. In the chronic cases a large proportion have been entirely relieved of their secretion, although occasionally a case has had a recurrence of the discharge for a few days during and following an attack of acute rhinitis. The discomfort, however, in these cases has been very slight, and the majority of the patients have not been aware of any special sinus involvement. They merely had a somewhat more profuse discharge from the nose than the average patient with a cold in the head.

In connection with the chronic cases I refer to that class of cases not complicated by severe ethmoidal and frontal sinus suppuration, for we realize that in the latter case continual secretion in the antrum may come from the ethmoidal and frontal sinuses. It has been my common observation that if an acute maxillary sinusitis accompanying an acute rhinitis be seen early, and the antrum be irrigated through diagnostic puncture in the inferior meatus as described, one, two, or three such irrigations at intervals of forty-eight hours will suffice for a cure. If the discharge persists beyond that time I feel that one is then justified in making a considerable opening beneath the inferior turbinate, so that continual drainage may take place from the antrum into the nose. Various operators use a somewhat differing technique for this operation, but the object attained by all is the production of a large opening through the antral wall at the level of the floor of the nasal cavity, and removal of so much of the anterior portion of the inferior turbinate as lies external to that opening. In this way continuous drainage is attained. Each time the patient blows his nose the air is forced into the antrum and the secretion forced out, thus allowing for good ventilation and relief of all tension in

the cavity, and a speedy absorption of the inflammatory products in the mucous membrane of the antrum.

The operation should be done under cocain anesthesia, a 10 per cent. solution being rubbed over the nasal wall of the antrum and adjacent parts to the inferior turbinate at intervals of five minutes. Adrenalin 1-10,000 materially aids in contracting the tissues and keeping the operative field free from blood. From twenty to thirty minutes suffice for such a thorough anesthetization that it is rare for a nervous patient to feel much if any pain during the operation. With scissors and snare I cut away about the anterior third of the middle turbinate from its attachment, and with Myles' punch, driven by a mallet, rapidly punch a hole into the antrum at the level of the floor of the nose. I have found a pair of Grunwald's cutting forceps most serviceable for enlarging this opening to any desired size. I have quite frequently used a large bone scoop to smooth the ridge at the floor of the nose. The resulting opening into the antrum is one that will readily allow for the passage of one's index finger. At the conclusion of the operation I blow into the nostril on the operated side about five grains of powdered suprarenal gland. This usually suffices to contract the blood-vessels sufficiently until a blod-clot is formed, and consequently there is very little secondary hemorrhage. Formerly the nose was packed with gauze, but this procedure does not allow so firm a clot to form, and induces hemorrhage. The bleeding is usually quite profuse when the gauze is removed the day following the operation. For about a week following, especially if there be much odor to the discharge, the antrum may be irrigated daily with warm normal saline solution. After that no care is given to the case beyond weekly inspection and transillumination just to judge of the progress of the treatment. Granulations spring up around the margins of the opening, and at the end of three or four weeks they greatly diminish its size. If these are cocainized and removed with cutting forceps they are not apt to recur, and the opening will again be at least half the original size and sufficient for all purposes of drainage.

In a few cases the discharge continues for months, with variations—sometimes more, sometimes less. If the patient be dissatisfied with his condition, and none of the cells in the upper tier,

ethmoidal or frontal, are involved, it may become necessary to decide upon a more radical procedure for the cure of the disease. With many rhinologists the Caldwell-Luc operation is the favorite one for this class. It consists in widely opening the antrum through the canine fossa, the inspection of the entire cavity, more or less through curetage of the mucous membrane, greatly enlarging the opening into the nose, the removal of the larger portion of the nasoantral wall, packing the antrum through the mouth-wound with gauze, and pushing the approximal end of the gauze through the nasoantral wall into the nasal cavity. The tissues over the external antral wall are sewed together or allowed to fall into apposition, so that the mouth-wound closes in two or three days. All subsequent packing and treatment of the antrum is done through the nose and nasoantral wall. I have tried this method, but not having been pleased with the results obtained, have since abandoned it.

Berens, in the *Laryngoscope,* November, 1904, advocates a modification of the Jansen method, by which the antrum is widely opened through the canine fossa as in the Caldwell-Luc operation; the entire mucous membrane of the antrum is removed, leaving the bone perfectly bare. He then removes the bony antronasal wall without destruction of the mucous membrane on the nasal side, removes the inferior turbinate from the overlying tissues, and stitches the mucous membrane of the nasal surface of the antral wall and that of the inferior turbinate into the cavity of the antrum. These membranes partially line the bare bony wall of the antrum, and serve as foci for the regeneration of the new connective tissue which lines the remainder of the antrum. In these cases the cavity of the antrum is practically made a part of the inferior and middle meatus of the nose. The facial wound is sewed up, the cavity lightly packed with gauze—which is removed in a few days—and no further packing and only occasional douching is resorted to.

The method which I have usually advised for the cure of an obstinate antrum suppuration which was not relieved by the nasal route is that of obliterating the antrum. For this purpose an incision is made as in the Caldwell-Luc and Jansen-Berens operations, and the mucous membrane of the antrum is removed with

the utmost thoroughness, so that the cavity of the antrum is made entirely bare. I think it is advisable to disturb the nasal wall, especially in the region of the normal ostium, as little as is possible, as the granulations in that region are most advantageous in helping to fill the cavity. At the conclusion of the operation the antrum is packed with iodoform gauze, the margins of the wound in the cheek being kept well separated by the gauze to allow of easy packing and inspection of the cavity. In a week the gauze is removed and reinserted. These packings are kept up for three or four weeks. The granulation tissue continues to grow and the entire antrum is filled with connective tissue and obliterated.

My preference for this operation is that having obliterated the cavity, no subsequent rhinitis can possibly infect it, as is possible in either of the other types of operation.

In conclusion, I would say that the last three types of radical operation have only been found necessary where some peculiar anatomic arrangement of the antrum existed in which adequate drainage was not afforded by the large opening in the nasal wall near the floor. It is only by widely opening the antrum that these anatomic peculiarities could possibly have been discovered and properly managed.—*Dental Cosmos.*

SOME PRINCIPLES RELATIVE TO PRESERVATION VS. EXTRACTION OF DECIDUOUS AND PERMANENT TEETH. By C. S. Case, M.D., D.D.S., Chicago Ill. In casting about for a subject upon which to write a short essay that will be of interest to the general practitioner and one which may prove to be instructive in the discussion that may follow, I have finally chosen a subject which much experience has shown me to be a phase of dentistry in which the errors of judgment are very frequent and very serious. Even in the practices of dentists who are otherwise skilled, it would seem that there is either a general lack of scientific knowledge along this line, or a thoughtless disregard of the principle which nature has so evidently considered of the greatest importance in the development of a wonderful system of dentition, which no thinking mind can contemplate without amazement and admiration.

The subject of this paper relates to the baleful influences and results which naturally follow the injudicious and unnecessary extraction of deciduous and permanent teeth. This is a subject to which, in a single society paper, I feel I can do but scant justice in the way of reciting and illustrating with casts the records of numberless cases to prove the foregoing strong statement.

It is a subject moreover which reaches into so many phases of dental and dento-facial irregularities, that I can do no more than touch upon some of its most prominent features with the hope of adding my mite toward the establishment of that higher plane of scientific dental practice which is sure to follow the permanent footprints of progression.

In regard to the importance of preserving the deciduous teeth, it would seem that enough has been said; enough was being taught in our colleges by competent teachers to prevent our students in after practice from making the mistakes they do. And of those who have not received these advantages, it would seem, moreover, that long experience in the practice of dentistry, confined as it is to so small an area of the human body, would prevent the possibility of that which at times appears to be a ruthless interference with one of nature's most important provisions.

The deciduous teeth are most evidently for the purpose of affording means of mastication during the years when full sized permanent teeth would be out of all proportion in size and appearance to those little jaws and features. They are there for the purpose of holding the fort, as it were, so as to give nature an opportunity to perform one of the most beautiful of her acts in developing and bringing forward the permanent teeth in successive and systematic stages, timed in proportion to needs and growth. They are there, moreover, for the purpose of establishing occlusal relations of the permanent teeth and harmonious relations of facial outlines.

At about five years of age the first permanent molars commence to crowd their way into the arches between the bases of the deciduous arches on one side, and the rami and tuberosities on the other. Nature, apparently conscious of the forceful influences of this eruptive process toward an interstitial forward movement of the entire deciduous dentures, has provided the deciduous molars

with broad, spreading roots so as to take a sufficiently firm and immovable hold of their surroundings to successfully combat this force, in the same way that will be found with the roots of trees that are subjected to the force of strong winds. Note, also, how perfectly nature under normal conditions has timed this eruptive stage to prevent that possibility which she so evidently fortifies herself against, and at the same time to take advantage of the general developing forces of eruption. She starts this stage of secondary dentition at a time when the strong phalanx of the deciduous denture is there, or should be there, to resist the forward pressure of these erupting molars; nor does she commence it before there is nearly enough room by growth for those large teeth; nor before the alveolar surroundings of the deciduous roots are developed to comparative stability; nor does she wait until those roots have become weakened by the eruption forces of the bicuspids.

What could be more prophetic than these painstaking acts on the part of nature in emphasizing the importance of preserving the natural relative positions of the bases of the deciduous arches, in order that the permanent molars which are destined to establish the occlusal relations of the adjoining permanent buccal teeth will not be allowed to drift forward of their natural positions; because it is upon the established position of the first permanent molars that the relative positions of adjoining buccal teeth are regulated, and this in turn finally establishes the occlusion and dento-facial relation of all the teeth.

From this we may draw a lesson as to the importance of preserving these temporary piers to the future arches up to the time of the eruption of their successors, because at whatever stage the arches are long deprived of their support, the permanent molars will surely tend to drift forward to fill the gaps, notwithstanding the restraining influences of perfect interlocking occluding cusps.

I wish to call your attention to another of nature's acts along this line which is prophetic of the apparently recognized tendency of the permanent molars to drift forward, and of the importance of preventing it up to the last moment. In the typically normal processes of secondary dentition—which usually prevails—when the second deciduous molars are thrown off, the second bicuspids

are ready to prick through the overlying gum tissue, and soon take their places in preserving the integrity of the arch. This is another reason for the spreading of those deciduous roots, that the resorptive forces of eruption may make a place beneath for the bicuspid crowns and thus permit them to erupt as much as possible up to the last moment of their power to hold the required space open; otherwise, as is frequently seen with lower second bicuspids, they are impacted in the dovetailing inclination of adjoining teeth.

It may be that this is one reason why the second bicuspids are the only teeth of the permanent dentures that occupy less space than the deciduous teeth that precede them, in order, perhaps, that they may have a little better chance to get into place before the adjoining teeth can shut them out. And thus I might take up one stage of dentition after the other to show how nature's ways are prophetic of the importance of avoiding the premature extraction of the deciduous teeth.

There are a number of allied branches of this subject also which time will not permit me to touch, viz., the normal influence exerted by dentition, by occlusion, by the action of the buccal and labial muscles, by the growth and development of the jaws, especially that of the mandible which Dr. Cryer has pointed out, all of which tend to characterize and establish the utility and harmony of the teeth in their relations to use and beauty, and which may be greatly interfered with by the premature loss of even deciduous teeth.

I cannot leave this branch of my subject, however, without trying to emphasize its greatest lesson. We are speaking of conditions which would have normally prevailed without interference. Conditions which nature in an otherwise perfect state would have brought about; but this does not mean a typically anatomical state, which is the exception rather than the rule, nor does it refer to those inharmonies in the relative size and position of the teeth, jaws, and general features of the individual which seem to have arisen from prenatal causes. It is this: If the permanent buccal teeth are permitted to drift forward ever so slightly from an otherwise normal dento-facial position in the arch, and the front teeth then erupt in alignment, an abnormal protrusion of the facial

outlines will be produced exactly in proportion to this movement. This shows how, from premature loss of the deciduous teeth alone, protrusions of the permanent teeth may arise which, though in amount but slightly change the facial contours, are sufficient to mar the expression of the entire physiognomy. When this occurs with both upper and lower dentures, with the teeth naturally retained in their normal occlusion and alignment—all of the buccal teeth having drifted forward together—it is a most unfortunate affair. Frequently people in general, and among them dentists of renowned ability in orthodontia, seeing these perfect conditions of normal occlusion, interpret the facial imperfections which have resulted from this local cause as inherent in the individual, or as the most perfect in facial outlines that can be obtained. They do not realize that in the faces constantly seen there are abnormal protrusions of a greater or less degree over the entire dento-facial area, characterizing the features, producing unesthetic expressions, marring those perfect outlines which nature would have produced had she been permitted to have her way.

Consider with me another phase: If this unnatural drifting forward of the permanent buccal teeth occurs—as it commonly does—before the eruption of the cuspids, and which may have been partly or wholly caused by the premature extraction of the deciduous cuspids in a foolish attempt to prevent an irregularity of the incisors, the irregularity which is characterized by a maleruption of the cuspids is frequently produced. This irregularity, more common with the upper than the lower cuspids, is the most frequent of any of the extensive malpositions which the orthodontist is called upon to treat. This fact alone, and because it most frequently arises from the injudicious and unnecessary extraction of deciduous teeth, stands in this stage of our professional progress as a sad commentary upon the appreciation of those higher principles which nature has emphasized, and which plainly show the importance of preserving the deciduous teeth.

It is with the above irregularity—crowded maleruption of the cuspids—where dentists most often err in an injudicious extraction of permanent teeth. In addition to the many instances of this character, where the bicuspids are wrongfully extracted for the purpose of regulating teeth by artificial force, there are a far

greater number of cases where dentists have extracted the bicuspids or the lateral incisors, and even the malerupting cuspids, in an honest endeavor to aid nature in correcting an irregularity, which to them seemed otherwise impossible. The case may also have been one which they as the family dentists had caused by an injudicious extraction of deciduous teeth or a careless failure to

preserve the deciduous molars up to the last moment of their usefulness.

Some years ago a prominent Chicago dentist called at my office and said, "Doctor, when you have cuspids that are erupting through the gums above, and with little or no space between the laterals and first biscupids, you have to extract teeth, don't you, to get them into the arch?"

I explained to him and showed with many plaster casts that, however irregular the teeth, however bunched, malaligned or malposed, they could always be placed in their respective places in the

arches and in normal occlusion; therefore, so far as the relations of the teeth to each other are concerned, no dental malposition should be taken as a basis for extraction. The only excuse, then, for the extraction of savable teeth must be that it is inexpedient or impossible to correct their positions in that way without producing facial protrusion. In nearly all locally caused malpositions of the teeth in immature arches, the final development of the jaws and general growth enlargement of the features, demand all of the teeth and their sustaining alveolar arches to harmonize facial relations. To remove one or more of them under these conditions will inevitably produce its effect. The effect upon normal arches that would be otherwise harmonious in size and relations is invariably an abnormal contraction of the arch so affected, and the ultimate forcing of the teeth of the opposing arch into the malalignment and malocclusion which frequently results in a facial deformity.

When these truths dawned on his mind, he said: "Doctor, I believe I have made a very grave mistake. I feel particularly bad about it because it has happened in a family who are my nearest neighbors and dearest friends. Wishing to do the very best for their little girl whose upper cuspids were erupting in this way, I extracted the first bicuspids and now at about 15 years of age I find that all of the upper front teeth are biting back of the lower ones, with quite a depression of the upper lip, which gives her the appearance of a protruding lower jaw."

Suffice it to say, the case was corrected, as shown by casts, see illustration, with a bodily protuding movement of the upper labial teeth, preparatory to inserting artificial bicuspids to sustain the arch.

Thus I might, if time permitted, continue this branch of my subject and show, by almost numberless casts, where dentists had injudiciously extracted permanent teeth, this resulting, from that cause alone, in decided dental and dento-facial irregularities.

There is another side to this subject which relates to the judicious extraction of permanent teeth from abnormal arches. My views upon this branch were published in the May, 1906, *Dental Cosmos* under the title, "The Question of Extraction in Orthodontia," which was calculated to show that in the practice of

orthodontia it is quite as much malpractice to avoid extracting teeth when demanded, as to extract teeth when not demanded.—*Dental Review.*

GOLD FILLINGS VS. INLAYS. By Don M. Gallie, D.D.S., Chicago, Illinois. In this age, when progress is the law of life and demands new ideas, it is but natural that the practice of dentistry has undergone many changes in the methods of procedure and means of restoring the teeth to their normal function. Indeed, the science of dentistry is well up in the procession of progress of the arts and sciences. The man whose knowledge rests with the extraction of a tooth, the plugging of a cavity or making of an artificial denture but poorly represents the high ideals of our profession. The dentist of to-day must be scientific, an artist and an artisan. He must know the pathology, chemistry, bacteriology and histology of dentistry. For they all play an important part in the successful accomplishment of our practical work, and it is upon one phase of our practical work that this paper is most concerned. When I accepted the subject of "Gold Fillings versus Inlays" from the chairman of the program committee it was not my purpose to advocate one method over the other or to claim that one possessed all the virtues and the other all the faults of tooth restoration; instead, it was to present a consideration of the conditions favorable to each, the sphere of usefulness of each, and the limitations that should govern methods of procedure and perchance sound a warning to some who are so prone to follow every new fad, folly and fancy that is presented. This does not apply to the careful, conservative and skilful man who fully appreciates the limitations of all lines of practice, but is meant for the man who accepts new theories and new methods because he hears they are quicker and easier, and to the young man whose experience has been so limited that he is not capable of judging which is the better line to pursue. I believe that the man who does not and cannot make inlay restorations is not giving the service that his patients are entitled to, and I am as firmly of the belief that the man who does not and will not make a restoration with foil is equally guilty. If all practitioners were of the same opinion as the writer there would be no reason for a controversy over the relative merits of each method of filling teeth; but

such is not the case; there are a few foil advocates who believe that inlays are a failure, and there are many inlay advocates who say that there is no question but what gold foil is an absolute failure as a saver or protector of tooth structure, and that it will not hermetically seal the cavity. This charge against gold foil is not a new one; it has always had its detractors, who have from time to time introduced new filling materials which were to supplant foil as a tooth-saving agent, but in the fight for supremacy gold foil has vanquished them one by one, until to-day it is not a contest between gold and a foreign agent but of gold in two different forms. It is but a few years back that the followers of the new departure claimed that gold, in proportion as a tooth needs saving, was the worst material to fill it with; they were led by a Moses who was to take them out of the wilderness, guide them over all the crevices and pitfalls and surmount the crumbling walls of carious teeth and thereon resist the onslaught of the enemy, decay; the failure of that campaign is familiar to us all. There was also a band of misguided ones who claimed that gold and amalgam failed because they did not stick, but who said we will cross the chasm, attack the ruined battlements, and there stick and build a fortification of solid concrete or cement which will hold out against the attack of the microbic host, yet in a short time it was found that this cement protector put up a feeble defense.

Not to be outdone, the objectors of gold brought forth another material, with a claim to mighty prowess, which would not irritate or shock, but which would hermetically seal the entrance to the battlefield, cut off the source of supplies, and thereby starve the legion of bacteria into surrendering.

Time soon demonstrated that they could not stand the pressure; they became battered and disfigured, and the fate of guttapercha and celluloid was sealed. Foil all this time was continuing to hold its own, meeting with greater success all the time. Soon a new Richmond entered the field, with followers from North, South, East and West, and while not great in number they were loud in acclaim. "We are irresistible; we are unconquerable; we are so similar to the real thing that the parasitic scout will not detect us; we are so smooth and so slippery that the enemy will break their necks or their legs in trying to pass over us, and if by chance any

succeed they will meet instant death in the trenches;" after a few skirmishes they began to give way and drop out one by one, and so silica, kaolin, feldspar and old zinc phosphate were detailed for picket duty to guard the battlefield, but to leave the brunt of hard fighting to old foil and the new ally, gold inlay. We trust that inlays will prove a reliable and substantial ally, but there are many who are a little skeptical, for they see that our new friend is a little too dependent on zinc phosphate.

Is gold foil a failure as a saver of tooth structure? It is true we see many instances where there is recurrence of decay, and we also see many instances where foil is saving teeth after twenty to forty years' service, to say nothing of the multitude of cases of ten years' standing, and these too in mouths that have not been immune to caries, where there was no idea of modern cavity preparation, no extension for prevention, no flat walls, smooth surfaces or right-angled anchorage to give the filling resistance to stress; no perfect restoration of the interproximal space nor marble-like contact, all of which omissions invite recurrence of decay. Yet with all these defects we find the ravages of decay thwarted by the skilful use of foil. What is true of these old fillings is more than true of the filling of to-day. Our knowledge of the cause and effect of decay, our superior technique, improved appliances, instruments and materials, and the recognition of prophylaxis on the part of our patients insures the stability of our work, and it is ridiculous to say that the filling of to-day can be considered a failure. For the past few years I have taken particular pains to examine and learn the history of the gold fillings coming under my observation, besides the records of my own work. I have done this for the purpose of learning something about the percentage of failures we hear so much about, and I can assure you that my experience and my observations have strengthened my belief that foil can be depended upon, and while I am to-day making as many inlays, both gold and porcelain, as the average dentist, it is not because I have lost faith in foil, but because I believe the inlay has its place. Let us now consider the class of cavities that call for foil and inlay, commencing with the six upper anterior teeth, and in these teeth we find the ideal cavities for the porcelain restorations; ideal from the esthetic standpoint and ideal for the reason that many of the cavities are so

located that the restoration is not subjected to stress, yet in these same teeth there are cavities and conditions that warrant the use of foil.

Porcelain is indicated in the following:

Labial cavities, those involving the gingival region and those that are found as structural defects, such as pitted teeth. Large mesioproximal cavities that extend well to the labial and some distoproximal that involve the labial surface, the mesial cavities being more in direct line of vision, especially call for porcelain.

Cavities that involve the whole incisal section of the tooth, such as are caused by imperfect development, and involving from one-third to one-half of the crown, and a small percentage of proximal cavities involving the incisal angle. These latter are the most difficult to handle. This is equally true of foil and porcelain. The thickness of the incisal edge and the bite are important factors in these restorations. The inlay in this class of cavity is only possible at the great expense of tooth structure; it necessitates a great cutting away of the lingual surface to give resistance form to seat the inlay, and even then there still remains the vulnerable point at the incisal, where there is liable to be fracture of the porcelain, permitting food stuffs and fluids of the mouth to find lodgment in the crevice, to say nothing of the annoyance to the tongue and the unsightliness of the defect. My observations lead me to believe that a much greater percentage of the inlays in this class of cavities fail than gold or gold and platinum. With the foil restoration we get the maximum of resistance, with a minimum sacrifice of tooth structure; with the aid of the screw anchorage at the incisal or the incisal step at right angle to the proximal surface we can make a restoration that will stand the force of occlusion, that will not chip at the incisal, cannot be forced from the axial wall, and the so-called unsightliness greatly overcome by the use of gold and platinum. Foil is indicated in many of the smaller proximal cavities where perfect cavity lines can be obtained without cutting as much as is required for the inlay. This is especially true of distal cavities, indicated in those proximal cavities that do not show from the labial but extend well on the lingual. In these cavities a porcelain restoration is liable to marginal fracture, and the enamel margin is also menaced by the stress and impact of the lower anterior teeth.

A typical example of this class is found in the distolingual surfaces of the cuspids. Incisal restorations made necessary by attrition should be made of gold or gold and platinum, preferably the latter, since anchorage can be obtained without much sacrifice of tooth structure, and when finished we have a filling that in every respect is satisfactory even to the eye of the most esthetic. There remains one more class of cavities in these teeth, and they should be filled with foil—namely, the pits on the lingual surfaces. The treatment of cavities in the lower six anterior teeth is a modification of the upper; the size of the teeth, the location of cavities, call for a more general use of foil than porcelain.

There remains one more class of cavities, and we leave the domain of porcelain. It is only a few years ago that the porcelain enthusiast told us that this domain included thirty-two teeth and 160 surfaces. These cavities are found at the gingival third of the buccal surfaces of the bicuspids, and their treatment in a majority of cases calls for porcelain.

Let us now enter the field disputed by the gold inlay. Since this paper was started one of your members has invented a method of making these restorations and has demonstrated beyond doubt that they can be made perfect and most beautiful. His genius and skill enlarges the field of usefulness of the inlay and brings it up to a standard that makes it worthy of a place alongside foil. We will first consider the cavities in the buccal surfaces of the molars. Many of these are small and can be prepared and filled in a few minutes with foil, but there are many that involve the gingival third, sometimes to half the surface and extending far under the free margin of the gum. Adjustment of the dam is impossible. The best service we can render here is the inlay and sometimes even the much-despised amalgam. The percentage of failures in occlusal cavities is considerable, due entirely to faulty cavity preparation and careless manipulation of the filling material. These cavities are caused by structural defects, and if these defects are entirely obliterated and the margins of the cavity extended in all directions sufficiently to insure a perfect finish of the filling with the tooth surface, the enamel margins properly beveled, the gold perfectly adapted against all walls and uniformly condensed, we will have a filling that should endure forever.

These simple occlusal cavities I believe call for foil in preference to the inlay. The cavity preparation is similar for both, with the exception that for the filling we can give retentive form by slightly grooving along the two strongest walls; for the inlay the surrounding walls must taper slightly from the pulpal to the occlusal surface, to permit the removal of the matrix without distortion, and it must depend entirely on the cement to prevent displacement. The sealing area is so small and the film of cement so minute that it is not sufficient to withstand the impact of occlusion. There is a class of occlusal cavities for which the inlay is admirably fitted; they are extensive, involving the whole surface, and often a large portion of the buccal. They are caused by the neglect of the ordinary structural defects and those caused by imperfect development of the occlusal third of the crown. In these we can get depth and breadth for the seating of the inlay; the weak and unsupported walls can be ground down so that the matrix can extend over them; the overlap can be burnished over the margins, acting as a protector of the cement and a reinforcement of the whole tooth. The cusps can be reproduced either by swaging or sweating, and the whole operation made a reasonably permanent and artistic success.

We now come to the class of cavities that requires our best efforts and greatest skill—cavities that I may say cause us more humiliation and embarrassment than any others. This is the proximo-occlusal cavity, and it is over the treatment of these cavities that the battle of pen and tongue is at present waged, as to whether they should be filled with foil or inlay. The inlay radical claims all the honors and virtues, declaring that in these cavities foil has been such a failure that its use should be discontinued. The foil worker, modest and conservative, justified by history, believes that the average proximo-occlusal cavity that we see day in and day out should receive the foil filling. It is indeed true that a great many of these restorations, and this applies to all kinds, are failures, and what is the cause? Is it because foil was used, or cement intervenes between filling and tooth wall? Or because heat and cold had been conducted to the pulp? By no means. The main reason for these failures is that no effort was made to remove or combat the conditions that were responsible for decay. The cavity was found in an unclean environment, was prepared, filled, and left in

the same environment. In the form of a narrow slot it was carried from a concave gingival wall to the occlusal surface, there to be met by decay from structural defects on that surface. The defect was allowed to remain. No cavity preparation along mechanical lines; filling retained by buccal and lingual grooves. How could a filling like this endure, and what was done to prevent recurrence of decay? Would the inlay with its cement ally do any better? What are the foil workers doing to prevent these failures? Just what the inlay advocate is doing—first obtaining sufficient separation to reproduce the original mesiodistal diameter of the tooth when the filling is in place, which will permit of a perfect restoration and preservation of the interproximal space. The cavity is extended in all directions, free from the unclean surroundings. The narrow slot is made broad buccolingually; the gingival wall is broad and flat, buccolingually, and as broad mesiodistally as the pulp will permit; the buccal and lingual walls smooth and at right angles to the gingival and axial, and running parallel from the gingivolingual and gingivobuccal angles to the proximoocclusal angles, unless the shape of the tooth demands a slight converging at this point, which is not possible for the inlay. The structural defect in the occlusal is removed by a step through that surface broad and deep enough, and slightly dove-tailed buccolingually to give perfect resistance form, and allow a sufficient amount of gold to withstand the stress of mastication. With the enamel margins beveled, and that with an intelligent understanding of the position and directions of the enamel rods, we have a cavity with smooth flat walls, no inaccessible undercuts, and all angles and margins in prominent view. There is nothing to prevent the perfect filling of this cavity, of getting perfect adaptation against these walls, unless it is that the operator is ignorant of the properties of gold and the use of the plugger. Non-cohesive or soft gold should be used for the gingival portion. With gold in this form we are able to get absolutely perfect contact against the walls, angles and margins most susceptible to recurrence of decay; the remainder should be filled with cohesive gold in any form preferred by the operator. The placing and malleting of the gold is a most important factor. I believe that the cause of many failures can be attributed to improper placing of the gold. The knack of

adapting and condensing gold by hand pressure is familiar to few. Were it more generally adopted, I believe we would have fewer failures. The finishing of these fillings is not the tedious and distressing operation that it is pictured. The carrying of our margins well to the buccal and lingual makes the finishing of these margins very easy; the intelligent use of the saw and strip soon finishes the gingival; the broad step on the occlusal soon gives way to the stone and disk, and the whole operation from start to finish seldom takes over an hour, and when complete we have a filling in perfect contact with tooth surface, with enamel prisms safely guarded, seated so that it resists stress and not dependent on the fickleness of cement to hold it in place. Unfortunately we find in these bicuspids and molars cavities that involve so much of the tooth surface that a foil filling would be beyond the endurance of the patient and operator, and in many cases impossible—so extensive that a plastic filling or the gold crown formerly were the means of restoring them to usefulness. Now the inlay receives them, and it is the undisputed champion in this field.

So far we find that the inlay and the foil workers are not so far apart; they both strive to reproduce or improve on the original tooth form. Cavity preparation is practically the same. But they differ in the means of holding the restoration in place, and the exclusion of moisture, one pinning his faith to perfect adaptation and contact of material, the other on the cement lining. Now, does cement do all that is claimed for it? We know that in some mouths it will give splendid service, while in others it is practically useless. We know that one cement will stand well, while another will fail in the same mouth. We even find that two fillings of the same cement will act differently in the same mouth. Does it not act the same in inlay work? The cement manufacturers in their directions of how to mix to get best results advise the thorough spatulating of the cement until it assumes a putty-like consistency. To do this the fluid must take up a certain amount of the powder. This same cement is used for inlay setting. It must be mixed to a creamy consistency. We do not incorporate nearly as much of the powder in the liquid, and consequently do not get the proportions that the directions claim give us the best results. Does this difference of the amount of zinc oxid weaken the adhesive qualities of the cement? It is said that cement

around an inlay only dissolves to a depth equal to half the width of the cement line. What authority is there for this statement? Have any scientific tests been made to substantiate this, or is it only a guess? Is it a case of the wish being father to the thought? Suppose we have only this minute channel; does it not leave the enamel rods unprotected? What is to prevent recurrence of decay around this crevice, and what prevents the enamel prisms from dropping out? We hear that no bacteria can live in this purifying ditch. Have we any reliable proof of this, or is this also a guess? We are told that this condition applies only to the porcelain inlay; that the platinum matrix stripped from the restoration permits that thickness of cement; but that the gold inlay fits so accurately that it practically comes in absolute contact with tooth surface. Poundstone, in his tests, found that the mixed cement is not in a perfect solution; he found there are granules that do not dissolve and if the inlay fits accurately these coarse granules are carried to the bottom of the cavity, and will not permit the inlay to go closer to tooth surface than the thickness of the largest granule, and allows only the thin cement to come to the surface and over the margins. Now it is further said that the thinner the film of cement between inlay and tooth surface, the stronger it is; that in this form it possesses its strongest adhesive qualities (it has been compared to glue), and that it cannot break at the cemented joint. How is it then that so many inlays become loose? You will say because the cavity was not properly prepared. These inlays loosen in cavities of perfect form, and they are not rare. I see them every week and they are not all mine.

It may be that cement mixed to the creamy consistency necessary for inlay work is most adhesive in this form were it allowed to harden undisturbed, but this is hardly possible under inlays that are subjected to stress. Before the cement becomes set the 100 to 300 pounds pressure exerted by the jaws disturbs the setting, and I believe breaks up the adhesiveness and attachment to the inlay or tooth surface. I have mixed a great number of the different cements, and have had ten other dentists mix them just the way they use it for inlay setting; the mixes were poured in tiny molds, and allowed to set. I found that the time of hardening varied greatly in every particular. Some of these little molds did

not harden in twenty-four hours. Some required fifteen, ten, and so on, down to one hour. Now this may be a very crude test, but it is no more crude than the way we mix our cement for this work, and I believe the process of setting is similar under the inlays to that in those molds; if this is true, I think we can account for so many inlays becoming loose. This little crude test demonstrated that cement is a very uncertain proposition; that it is not a consistent performer.

One claim made for the inlay is that the conductibility of heat and cold is broken up by the thin film of cement; this is partly true, yet I see many inlays that are troublesome in this respect. We also can reduce the conductibility of thermal changes to a minimum in the gold filling, by the use of any of the cavity linings, and a lining of cement over the pulp.

I do not find the question of conductibility a very serious one, and would not be influenced for this reason alone to adopt the one restoration over the other, but many inlays are perilously near the pulp, and I am afraid that those doing the extensive cutting that some inlays demand will have trouble in time with some of the pulps under the inlays. Now, the whole question of filling versus inlay should be governed by horse sense and judgment. When the conditions warrant the use of the inlay, let us use every care and all the skill at our command to aid in proving that it is something we can depend on, and let us also continue to use foil where it is indicated. Keep your pluggers in a handy place, for remember they are responsible largely for our successes in the past.—*Dental Review.*

TRIFACIAL NEURALGIA. By W. S. Wiatt, M.D., East St. Louis, Ill. Trifacial neuralgia varies in intensity from the so-called "brow ague" or "sun-pain" of the laity—which is local manifestation of constitutional disease—to the paroxysmal, agonizing pain called tic-douloureux.

The former, or minor neuralgia, is amenable to remedies which have no influence on the latter, and the pain is not paroxysmal. Tic-douloureux, or major neuralgia, generally involves the second or third division of the fifth pair of nerves, is characterized by muscular spasm of the side of the face involved, and is generally unilateral—the paroxysms increasing progressively in frequency

and intensity, there being entire freedom from pain during the remission. It occurs generally between the ages of thirty and fifty years. Slight stimuli, as chewing, wiping the face with a towel or speaking, may induce a spasm. It may last an indefinite number of years—spontaneous cure of genuine tic being unknown.

The pathology of trifacial neuralgia, algebraically speaking, is an unknown quantity—the reports of eminent authorities being so much at variance as to lead us to conclude that the disease has no definite pathologic entity.

Keen and Spiller have shown that degeneration in the Gasserian ganglion is present in recurrent tic. Spiller examined fifteen ganglia and found degeneration in all of them; and he maintains that if degeneration begins at the periphery it soon extends to the ganglion.

C. H. Mayo suggests that this ascending degeneration from periphery to ganglion is caused by faulty or deranged vascularization.

Three things are essential to the recognition of pain anywhere, viz.: (a) Peripheral sensory irritation; (b) Transmitting media from periphery to brain; (c) Cerebral centers for the interpretation of the sensation. Then any cause which produces peripheral sensory irritation, as a carious tooth, may, if the other two essentials be intact, be an etiologic factor in the production of trifacial neuralgia.

Treatment: The more thorough the knowledge of the pathology of a given disease, the more rational ought to be its therapy if it be curable by therapeutic agents. Age and experience in the thinking, observing medical man beget conservatism; and by virtue of this acquisition he is able, therapeutically speaking, to testify to the scarcity of specifics for disease.

Multiplicity of remedies for a given disease is a natural sequence of multiplicity of ideas as to its cause and pathology. For this reason tic-douloureux has run the whole therapeutic gamut—from castor oil and strychnin to radium and thorium (its cheap substitute), electricity and the X-ray.

With the exception of the injection of osmic acid into the nerve trunk, drugs have no place in the treatment of major neuralgia.

The most rational surgical treatment will consist in the complete and *permanent* separation of the cerebral centers concerned from peripheral sensations, with the *shortest* period of disability and

the lowest rate of mortality. Striving to achieve these much desired ends, surgeons have resorted to two classes of operations, viz.: Intracranial and extracranial. All intracranial operations for the relief of tic may be classed as major-surgery—with a chance of permanent disability if the ganglion be removed, as loss of eyesight on the affected side; also a chance of recurrence if the ganglion be *not* thoroughly removed—and a mortality varying from 15 per cent to 33 1-3 per cent in the hands of the most skilful operators. All extracranial operations may be classed as minor-surgery, with a short period of disability, a tendency to recurrence, and a mortality amounting to nil.

J. Ewing Mears, in 1884, suggested removal of the ganglion, and Rose was the first to perform the operation in 1890. Hartley, Krause, Hutchinson, Keen, Cushing and Crile have elaborated the technic, but it still remains one of the most difficult and tedious operations in surgery—the time consumed varying from one and three-fourths to three hours, and then the operation has to be abandoned frequently before completion.

The reasons for this are the facts that the ganglion is in an almost inaccessible location on account of the hemorrhage to be overcome before reaching it—and after reaching it important structures, as the sixth nerve and the cavernous sinus, are so intimately connected with it that its complete removal endangers them. The profound shock frequently following operations involving the fifth pair of cranial nerves need not be mentioned here. Add to these objections the possibility of a sloughing cornea, and we can readily understand why the most skilled American surgeons exhaust every other resource before doing the operation.

Shock, meningitis from wounds of the Eustachian tube by trephine, from infection from without, and cerebral abscess are mentioned by Lexner and Turk as causes of death in an analysis of 201 operations. Abbe, appreciating the difficulties and dangers attending the removal of the ganglion, conceived the idea of interposing rubber tissue (sterilized in bichlorid solution and washed with normal salt solution) between the cut ends of the resected second and third divisions. The ganglion, with the second and third divisions, is exposed to their foramina of exit, a section of nerve extending from its foramen to the ganglion is removed, and the rubber tissue pressed on the floor of the skull with gauze so that it

covers both foramina. He reports a number of cases with no recurrence. The method is only applicable to cases in which the second or third divisions are involved—but these divisions, one or both, are the ones always involved primarily.

C. H. Mayo, acting on Abbe's idea of interposition of foreign material between the cut ends of resected nerves to prevent regeneration of the nerve trunks and recurrence of the pain, applied the principle to extracranial resection by plugging the foramina of exit with silver screws, and the inferior dental canal with lead to prevent regeneration of the trunk which he had resected.

Mayo's technic consists in exposing the nerve at its foramen of exit, grasping it with a pair of forceps and using the Thiersch torsion method to windlass as much of the distal and proximal part of the trunk around the forcep as possible before dividing it. It seems to the writer that this is the most rational of all the extracranial methods yet devised. *When applicable,* it more nearly approaches the standard of aseptic technic than the osmic acid treatment first suggested by Neuber of Kiel—first used by Bennett and later by Murphy.

Seven to twenty minims of a 1½ per cent to 2 per cent solution of osmic acid is injected into the nerve trunk in several places at its foramen of exit. The foramen is also injected, and the fluid prevented from escaping from the wound by a pledget of gauze or cotton. Contact of the fluid with nerve filaments in the wound is necessary if a perfect cure is to be expected.

The wound frequently heals by first intention, sometimes necrosis of the overlying skin occurring with suppuration—and if the injections were made in the mouth, suppuration occurred frequently in the cases reported by Murphy.

The above are objections which cannot be raised against the Mayo method, if aseptically carried out.

Spiller and Frazier, after having proven by experiment on dogs that the sensory root of the ganglion would not regenerate after section, and that a nerve trunk must possess an axis-cylinder and neurilemma to regenerate after section, conceived the idea of resecting the sensory root for tic-douloureux. They claim for the operation that it requires less time, is easier to perform, has a lower mortality and that there is less danger of wounding the cavernous sinus or sixth nerve and that no trophic disturbances follow. In

June, 1904, they reported four cases in which the sensory root was divided and there had been no recurrence in a single case up to that time. If their conclusions be correct, this is the ideal intracranial operation for tic.

We report the following case—since it illustrates the advantages and objections to extracranial resection of the nerve trunk:

Report of Case: Name, Mrs. L———, date August 20, 1903; occupation, housewife; nationality, American; social condition, good; diagnosis, tic-douloureux.

Family history.—Parents dead. Mother died with typhoid. Father murdered by Indians. Oldest brother had facial neuralgia.

Previous history.—Had jaundice in 1892. Had gallstone colic before she had jaundice. Had chills in the fall, years ago, before she had jaundice.

History of present illness.—In January, 1901, first attack. Was quilting and noticed twinge of pain at ala nasi. Had a bad cold, and the next morning the first bite of breakfast she took the pain returned. Paroxysm would last five minutes. Would not return until she tried to eat. All teeth had been removed twenty years before the first attack. In December, 1901, pain returned when she went to wipe her face with a towel. Attack lasted from December, 1901, until April, 1902. Paroxysms involved the second division only, extending to last molar in upper jaw, left side. Talking, eating or wiping the face would bring on an attack. Dysphagia was a well-marked symptom.

Pain recurred in January, 1903—and attacks became more severe, lasting longer, with shorter remissions, until August, 1903, when the patient was operated on.

Operation: August 21, 1903. Nerve was exposed at the infra-orbital foramen, and after windlassing as much of it out as possible by the Thiersch method, was resected. By this method we succeeded in resecting about one inch of the nerve trunk. The patient was free from pain until November, 1906. In April, 1906, she noticed a slight pain on wiping her face. In November, 1906, while eating breakfast, the pain recurred. Attack lasted five minutes—and recurred about three times a day for three or four days—then left, but returned in three weeks, having only a few twinges of pain. Has not recurred up to the present date, January 20, 1907. Patient is in perfect health. Sixty-five years old last October.

Present condition.--Partial loss of sensation over area of distribution of infraorbital nerve.

From the recent history of this case the nerve is undoubtedly regenerating. Resection gave relief for over three years, but as soon as the nerve is completely regenerated, there will be a recurrence of the pain.

When recurrence does take place we will resect again, and plug the foramen of exit with a silver screw, as suggested by C. H. Mayo. If the pain recurs after this, then we will be justified in resorting to one of the intracranial methods.—*Dental Brief.*

THE BUSINESS PART OF A DENTAL PRACTICE. By W. C. Trotter, D.D.S., Toronto, Canada. The subject I have been asked to take up is the "Business of Dentistry," as applied to dealing with patients, accounts, fees, appointments, collections, partnership, buying of supplies and the handling of waste products.

Money getting should not be the sole or chief aim of any man, and much less of the dentist. A moderate income is, however, very useful and necessary to every one of us. The teaching of any method or system which will aid the dentist to secure an honest and modest livelihood, with the least possible expenditure of time and loss of vital force, is, to my way of thinking, as useful as is the teaching of materia medica or chemistry. In the past it was the custom to impart to dental students only such knowledge as would benefit the patient who intrusted himself to their care and judgment. This was quite right. But now that these departments of study and research are so complete, it is only fair to the student to look slightly to his future personal welfare and teach him how to look after himself, now that we have so thoroughly instructed him as to how to look after his patient. Is it not a fact that most of the men who commence the practice of dentistry are grossly incapable of looking after their own personal interests, and are so lacking in the general business principles of conducting a practice and of economizing their time that they soon become the slaves of an unremunerative, laborious, nerve-racking practice? Once a man starts in the wrong way, how difficult it is for him to secure the necessary instruction later on, and how much more difficult it is for him to alter his ways and adopt new systems!

In dentistry, as in every other calling, there is a right and wrong way of doing everything, and a good, better and best way of doing the right. I am going to endeavor to suggest some proper systems useful in the conduct of a dental practice from a business standpoint—systems that tend to economize the time and vitality of the practitioner and yield him the largest possible return per hour without sacrificing the interests of the patient. First and foremost, I believe that a dentist should work his very hardest and best when he does work, and should concentrate every effort on accomplishing the most and best results for the patient, and ultimately conserve his own vitality, because he can afford to work shorter hours than if he was only half working. It is so easy to get into a habit of tinkering with patients most of the day and really accomplishing very little actual work that counts for anything, although we may be at it steadily for eight or ten hours a day. The man who concentrates his efforts and makes every minute tell accomplishes much better results in much less time. He works steadily six or seven hours a day and has time to go out and get the much needed fresh air, sunshine and exercise which replenish his store of energy and properly prepare him for his night's sleep and his next day's duties. During most of this time the slow, unmethodical man is still at work in his office, working under the false impression that he is getting ahead of the other fellow who is out enjoying himself. A man who takes interest in things outside of every-day work and indulges in healthy recreation never loses anything, providing he thoroughly attends to his work when he is at it. He is a broader-minded, healthier man, and is more popular on account of it, and thus secures a larger clientele and higher fees than the slow, unsystematic plodder who works from daylight to darkness without intermission.

How can a dentist make the most of his time without sacrificing the welfare of his patient? He should not arrange to see more people in a day than it is possible to attend to properly, thereby crowding the days so that really very little is actually accomplished. By arranging too many appointments for the day an overlapping delay of appointments is brought about which is very annoying both to patients and operator, causing the latter loss of time and money, and the former improper and hurried attention. To avoid this the dentist should carefully and accurately gauge the time

required for each patient with whom he makes an appointment. This is not a difficult matter, providing he has previously made a thorough and complete examination of the mouth and entered it upon a chart. Of course, the longer a man is in practice the more closely is he able to gauge the time necessary for him to perform certain operations. By allowing more time for appointments than is necessary to do the work required the same losses may be incurred as by allowing too little and having too many appointments, but the former mistake is certainly productive of less annoyance and loss to both patient and operator than the latter. If the day's work is systematically arranged for and every minute is made to tell, six to seven hours of such steady work ought to be enough to satisfy any reasonable man. One cannot start work too early, providing he reduces his hours at the other end of the day. From 9 a. m. to 12:30 p. m., and from 2 p. m. to 4:30 p. m. are very convenient office hours. These, of course, would have to be varied according to local conditions and personal habits. If a man is occupied continuously at the chair during these six hours his fees for a day should total at least twenty dollars on an average. If in the course of a period of time a man's earnings fail to average at least three dollars per actual working hour, he may make up his mind that something is wrong either with his system or his charges, or both. He is wasting time somewhere during the day, or is not getting adequately paid for his services.

I am not in favor of a special hour being daily set aside for examinations and treatments without special appointment, because some days there might be more people turn up than could be attended to during the allotted time, whereas on other days no one might come and the hour would be a total loss. Then, again, it is much more difficult to charge for time spent thus on a patient in which no special appointment has been made than where a regular time has been set aside for them, even if it is only ten minutes. An appointment for everyone, no matter how trivial the services required, is my plan. By reserving fifteen minutes for an examination one seldom actually loses any time, because it affords time to properly and thoroughly examine the teeth and to correctly enter the results of the examination on the chart. If there are any treatments or separations to be inserted this is the time to attend to them. As a rule, even if no other work is found to be necessary,

the patients will desire their teeth polished, and the quarter-hour reserved can be used very profitably at this work. All arrangement for future appointments, and any discussion of fees or times of payment should take place at this first sitting. A thorough understanding regarding fees and payments of same at this time saves possible misunderstanding later on. If the subject is properly and discreetly approached no offense need be given in discussing this subject. If your patient is a stranger to you and comes unrecommended, by remarking that a certain tooth should be fixed in a certain way but that it will be rather expensive, or by some other such strategic remark, you can introduce the discussion of fees and lead up to terms of payment without the patient ever suspecting what you are about. In this discussion you can usually size up the patient's intentions in regard to payment, and can accordingly ask for payment in advance if you have any doubts on the subject. Frequently we have no one to blame but ourselves when we get stuck with bad accounts, as we sometimes lay ourselves open to such impositions by being too shy or unbusinesslike to discuss the subject with the patient at the first sitting for fear of giving offense or driving them away to our confrère across the way. It is not well to be too anxious to turn out work and make your month look large, regardless of how you are going to get paid for it. Much time is lost by inserting an unnecessary number of treatments, for which it is generally impossible to get adequate compensation. System should be used in treating teeth just the same as in any other dental work. Whatever number of pieces of cotton soaked in medicine you deem it wise to insert in each root canal should be always adhered to in treating all teeth, so that you will always follow exactly the same routine in performing operations or treatments under similar circumstances. In this way a great deal of valuable time is saved and unnecessary complications are avoided. Time can usually be saved by inserting treatments during appointments for other work, as a certain amount of time is always consumed in ushering the patients into the operating room, greeting them and applying a clean towel, and bidding them adieu and ushering them out; so that the fewer number of appointments necessary to accomplish a patient's work the better. Cultivate the habit of always examining the teeth in a certain definite order, thoroughly examining all surfaces of each tooth before proceeding to the next

one, and entering the results on a diagram card as you go along. When the examination is completed it is frequently advisable to give the patients a hand-glass and show them the chart which you have marked and explain everything thoroughly to them. I believe in giving the patient as full information as possible, and think it much easier to insert work in the mouth of an interested and willing patient than in that of an ignorant, restless, disinterested one. A great deal of the difficulty in handling the patient, both while in the chair and also later when it comes to settling the account, may be avoided by explaining everything thoroughly to him at the first sitting and also during the progress of the work. As much as possible, always have definite instruments to perform certain stages of every operation; use them in the same consecutive order, and always keep them in the same relative position in your tray or cabinet, so that you could pick them out in the dark if it was necessary. The busy dentist should never have to spend time looking for anything.

I find it a great convenience to have a second instrument tray, which I use entirely for gold instruments, annealer, burnishers, matrices, etc., and which can be swung around to the patient's chin as soon as the dam is on and the cavity prepared. For this idea I have to thank Dr. Caesar, in whose office I first noticed it in use.

After an operation is once commenced the patient should never be left, unless it is for the purpose of attending to something in the laboratory for him. The telephone should be attended to by someone else. Only under very exceptional and urgent circumstances should one patient be left in the chair while you attend to another one.

It does not pay to allow agents or collectors to interview you during office hours, either personally or over the telephone.

Appointment cards stating the exact hour and the day should be given to each patient making an engagement, and these cards should have a note on them calling the attention of the patient to the fact that engagements broken without adequate notice will be charged for according to time reserved.

Too great familiarity or sociability with patients is not desirable, and frequently interferes seriously with the proper kind of business relations which should exist between patient and operator.

It is not our closest friends and relations that are usually our best patients. Too much conversation at the chair interferes with the efficient work and consumes time. Nevertheless, it is a decided advantage for a dentist to be possessed of such a broad field of information as to always be able to enter into casual conversation with his patient on almost any subject. Some men talk so persistently while operating that they worry their patients and earn for themselves an unenviable reputation of wasting the time of their patients, and charge the same as if they had been working instead of talking. These are busy times, and the dentist who values the time of his patient in every respect as well as his own is sure of success.

A man who attempts to work societies, clubs, lodges, etc., for business will usually find the business so obtained costs him more than it is worth.

In regard to fees, I think it would be better for all of us if we charged more on the basis of the time and skill expended on operations rather than on the basis of the material consumed. I believe that, to a great extent, we are ourselves responsible for the value which our patients put upon our services. Our own opinion of ourselves and of the value of our time and skill seem in some way to be unconsciously communicated to them, and they judge us accordingly. In the matter of keeping accounts and of collecting them there is no system as convenient and as complete as that of diagram dental charts with columns on the reverse side for keeping track of the account. Each day the charts for the various patients who have appointments should be laid out on the desk for easy reference, and the charges should be entered on these by the dentist at noon and at night. Not more than ten minutes a day is necessary for this work, and then, when the cards are placed in their correct alphabetical position in their proper compartments at night, all the bookkeeping is absolutely up to date. Those cards, the work of which is not completed, are kept in the "Unfinished Work Compartment;" those representing work which has been completed but not paid for are filed away in the "Finished Work Compartment;" and this represents the old-fashioned ledger, except that it is much simpler, for at the end of the month, when the accounts are to be sent out, all the assistant has to do is to take the cards out of this compart-

ment and copy on to statements the names, addresses and totals owing. There are no old, dead accounts to be gone over each month as in the old days. Those cards which are finished and the work paid for in full are filed away in the third compartment as "Closed Accounts," where they are always readily available for future reference whenever the patient to whom they belong returns. One cannot be too careful in correctly and thoroughly entering all work on these diagram cards, and in describing, by means of abbreviations, the treatments which are inserted, together with results and remarks on same. We never know when this information so systematically stored up may be of incalculable benefit to us, either for our own satisfaction or in possible disputes with misguided patients.

I think it advisable to render statements every month for all complete work regardless of how recently it was completed. One should endeavor to train his patients into the idea that he expects prompt settlements, and if he does this in the proper way no offense is given and both parties are better pleased. The majority of patients appreciate regularity, promptness and system even in collecting money from them. I have always had a line at the foot of my statements to the following effect: "Settlement expected immediately upon completion of operation; items of account may be seen at the office if desired." Now, I do not mean to imply that this rule has been strictly lived up to, but nevertheless it goes a long way toward ensuring prompt settlements. It lets people know that your system of business is really cash, and that if they are allowed to settle monthly, quarterly or half-yearly they are privileged and should not abuse the privilege. This little note on my statements has extracted me from many a dilemma. Patients who object to being pressed for payment can frequently be reasoned with by showing them this notice on their statements, and explaining to them that you make no pretense of giving credit and are not treating them any more harshly than you would anyone else, but that it was simply your principle of doing business on a basis of prompt settlements. After a while people get to know the conditions under which you do business and come prepared to settle promptly. If collections are followed up systematically the sum total of accounts owing should not be greater than the total work turned out during the previous two months. Deadheads and people who are slow pays usually avoid a man who is strict about these mat-

ters, and it is needless to say that he is better off without such patronage. A man should not lose more than three or four per cent. of accounts a year if he is reasonably careful. Accounts which have to be given to a professional collector ought to grow less and less in number every year a man is in practice. Such accounts should not be encouraged. There is very little satisfaction in suing for payment of dental accounts, as people who allow themselves to be pushed to this extremity before paying are usually proof against law. We are apt to be too anxious to turn out volume of work, and pay too little attention and thought as to how we are going to be paid for it.

It is decidedly useful to keep a small daybook in which to enter the work done each day, thus affording a means of estimating the work done each month or year. Account should also be kept of all cash received and of all paid out. Unless a man has a pretty definite idea of the amount of business he is doing and of the amount he is collecting he cannot properly regulate his expenses and keep them well under his income as he should do.

The best earning years of a dentist do not extend over twenty years, and during these years he should endeavor to arrange to have from fifteen to twenty thousand dollars, otherwise he runs a great risk of being compelled to stint himself and his family in later years. We should not allow ourselves to be misguided by the sight of dentists who live to a ripe old age and remain able to earn a good livelihood right to the last. These men are the exception, not the rule, and usually possess constitutions much above the average. The fact that it is not possible for a dentist to acquire great wealth from the practice of his profession should discourage no one. It is certainly not the wealthy who really enjoy life or are really to be envied. We must all observe this fact sooner or later. The man who really enjoys life is he who has to work for a moderate income and who lives within his means, satisfying himself with the gradual but sure method of accumulating a modest competence. He need have little to worry about, and need never fear being in want if he will abstain from needless extravagance and will satisfy himself with the idea of gradually saving fifteen or twenty thousand dollars during his active years of practice. Such a man need not ruin his constitution with overwork, but by good management need not work

more than six or seven hours a day, and can afford to take his Saturday afternoons off, besides indulging in a few weeks holidays each year. To do this he must, of course, conduct his practice on a pay-as-you-go plan. He must charge fees which will at least average him three dollars per working hour, and must economize his time in every possible way by the most complete system in regard to appointments, convenient arrangement of instruments, medicaments and supplies, and in the prompt collection of his accounts. All this is no hardship; in fact, a man ought to take pleasure in having everything running like clockwork during his office hours.

Rent should not amount to more than fifteen per cent of receipts, and supplies should not cost more than twelve to fifteen per cent of business done.

A system and habit of promptly settling one's own debts the first of every month is about as important as promptly collecting from other people. One cannot place too high a value on his own honor and credit. Besides, it is always cheaper to pay cash, and saves many a worry. It also tends to prevent reckless extravagance. The dentist who allows himself to get into debt and has collectors calling on him is injuring his practice. In purchasing supplies it is always more economical in the long run to buy the best regardless of cost, and where you are using large quantities of any one material, buy it in quantity at quantity rates, but do not store up stuff you seldom use and which is liable to deteriorate. Hesitate to buy new appliances until they have been demonstrated and tested beyond a doubt.

It is not profitable for a busy dentist to refine his own scrap, but he should carefully preserve all strips, disks, filings, sweepings, etc., for they amount to quite an item during the year.—*Dominion Dental Journal.*

CHEMICAL THERAPEUTICS. By Dr. J. S. Cassidy, Covington, Ky. A settled idea, engendered perhaps by careless teaching, seems to possess the minds of not a few, that medicines, in order to exhibit their special virtues, must induce and perform some chemical interaction; whereas, it is observed that really many potent drugs retain their chemical integrity during the whole period of their therapeutic action.

Such purely chemical compounds as sodium chlorid (Na Cl),

mercuric chlorid ($HgCl_2$) and arsenous trioxid (As_2O_3), as examples in contradistinction to indefinite mixtures, have a distinctively individual identity of their own, peculiar to and because of their definite molecular construction, and not by reason of certain properties possessed by their constituent elements act in their capacity of compounds, without necessarily undergoing chemical change.

Compound molecules should be regarded as individual substances, and not as showing in any way, except by analysis, the nature of their composition. Indeed the philosophy of molecular construction is one of the most fascinating subjects pertaining to pure science.

The familiar substance, ammonia (NH_3), is an alkali, while the substance (HN_3) is decidedly acid; it is noticed that these two representatives of two opposite classes are made up of the same elements, both of which when free are perfectly neutral.

Elementary arsenic is non-poisonous, but when combined with inert hydrogen, we have (AsH_3) a most violent poison. Carbon and sulfur are both solids and odorless; unite them chemically and a disgustingly smelling liquid (CS_2) results.

That compound molecules possess properties of their own as such, independent of elementary characteristics, is shown most decisively by the great variety of those tens of thousands of compounds classed as organic. They are made up mainly of only either C and H, or C, H and N, or C, H, N and O. Neither one of these elements is endowed, for example, with poisonous properties, but the molecule HCN is hydrocyanic acid. $C_5H_5N_5$ is basic adenin, C_2H_6O is ethyl alcohol, $C_3H_6O_3$ is lactic acid, C_6H_6O is phenol, $C_{17}H_{21}NO_4$ is cocain, $C_{17}H_{23}NO_3$ is atropin, and so on, *ad infinitum*, each molecule standing for the whole mass of its kind, and differing apparently only from all other kinds in the several fixed number of atoms in each and the probably fixed arrangement of these atoms in space.

It is quite evident that the medicinal values of at least some of the above few compounds would be difficult to explain by chemical equations, even if we could assume that they must decompose simultaneously with the exhibition of their virtues.

There is, however, some basis for the claim that adenin ($C_5H_5N_5$), an alkaloidal polymer of hydrocyanic acid, produced by physi-

ologic change in living bodies, might, by faulty metabolism, suffer entire resolution into that acid 5 H C N and thus cause autointoxication; for it is found that if adenin be heated with potassium hydroxid it yields equivalent quantities of potassium cyanid. $C_5 H_5 N_5 + 5 K O H = 5 H_2 O + 5 K C N$.

This simple equation, which is plainly self-explanatory, presents an interesting text for nature in this connection. Both reacting bodies are strongly basic, their molecular vibrations in space probably approximate, they are friends, and therefore are not disposed to change by coercion each other's nature, but let some disturbing cause, like a little heat (200° C.), appear; the less stable molecule, adenin, is unable to resist that influence, and indignant at the persistent equanimity of its quondam friend, lets its atoms go free to form an acid. The newly fledged acid and the stable persistent alkali are natural enemies, as acids and alkalis always have been and always will be; they at once destroy each other, producing water and potassium cyanid as the results of the battle.

Perhaps the kind reader, in case these lines are blest with such a being, will think that this way of endowing the various kinds of matter with personal intelligence is frivolous and undignified; nevertheless the facts in this case are just as described; and they afford a key to open up and make clearer our conception of things, in more complicated molecular changes.

It is a fundamental truth in nature that everything animal, vegetable and mineral, animate and inanimate, solid, liquid or gas, whether in mass or single molecule or free atom, or to go further and include the recently accepted "electron," is persistent in its desire to remain as it is, and at the same time to try to compel all other things to become like unto itself. It is only in this way, by difference in states of excitation, that energy of all kinds is developed, through mutual resistance and coercion until equilibrium is established. That all natural phenomena are due to the universal law of motion is an inevitable conclusion.

Health, accordingly, is an effect of normal vibrations of the particles forming the various tissues; and therefore, in its ultimate interpretation, the question of health and disease is reduced to prosaic mathematical rule. Variations in these vibrations from the

normal standard, peculiar to each kind of tissue making up the whole organism, must necessarily have abnormal effects, analogous to the changes of color proceeding from variations in the number of light vibrations that strike the normal retina.

From a purely materialistic viewpoint, in the sufficiency of which I do not by any means incline to believe, the intangible mind, itself the effect of disciplined multiform modes of motion, should be able to control certain phases of these vibrations, hence, really, the will power is recognized as an important factor in therapeutics, not alone in the list of vague neuroses, but also in the more direct and exacting practice of our profession.—*Dentist's Magazine.*

Correspondence.

Editor, DENTAL DIGEST:—I believe there is a wide field for dental education that has not yet been explored. There are a large number of dentists in practice who have not graduated from any dental college, some having taken a partial course and some who had only the instruction of a private practitioner. Many of them are good dentists and stand high in their own communities and among their confreres. They cannot leave a good practice to be scattered among others and at the same time care for their families while spending three years taking a regular dental college course, as they would have to do as facilities are now. Would it not be possible to establish a correspondence course in connection with some good dental college, or establish a separate school for such a course, to apply only to dentists who have been in practice for a specified number of years? Such men could get the scientific part of the profession while still conducting their practices, and when they had the work completed could take a final examination, possibly also put in a month or so in laboratory instruction, if necessary.

I believe such a school would be legitimate, if properly conducted, and would be of vast benefit to the profession.

—DENTIST.

The Dental Digest.

PUBLISHED THE LAST WEEK OF EVERY MONTH

At 2231 Prairie Avenue, Chicago,

Where All Communications Should be Addressed.

Editorial.

IS THE PROBABLE FORMATION OF LACTIC ACID IN THE MOUTH A RATIONAL EXPLANATION OF ALL PHASES OF DENTAL CARIES?

In the past many theories have been advanced on the etiology of dental caries. For a time it was thought that the dissolution of tooth structure was due to some inherent weakness in the tooth itself. The experimental work of Black on the physical properties of dentin, demonstrating that this structure is practically the same in all teeth, and closer clinical observation by the profession at large proved conclusively that the theory of the inherent weakness of the tooth structure fell far short of a rational explanation of the cause of dental caries.

In 1884-5 the late Prof. W. D. Miller published the results of a series of experiments which he had been conducting, and thus advanced the following theory on the etiology of caries of tooth structure: In the sulcus of a tooth, or between two teeth, or in any pit or irregularity of its surface, food lodges. By the action of some ferment this is perhaps changed into a fermentable sugar. This forms a suitable medium for some of the bacteria, and it is perhaps at once infected with certain acid-producing fungi, which in their growth split up the fermentable sugar, building into their own substance such elements as are necessary, and leaving the remainder to form new combinations, or by-products, one of which may be lactic acid. This acid, especially active in its nascent or formative condition, attacks the teeth, dissolving out the calcic salts, and forming a depression in which

more food lodges, to pass through the same changes and to be in turn decomposed by new colonies of bacteria, thus forming more acid to continue the destructive work. Miller's theory of decay has now been standing almost unchallenged for over twenty years. While the profession generally has accepted it as correct, it is quite evident that to-day there is an underlying thought among observing, thinking men that the probable formation of lactic acid in the mouth does not offer a rational solution of the entire problem.

In an article recently read before the Chicago-Odontographic Society, Dr. J. V. Conzett of Dubuque, after briefly reviewing the work of Miller, Black, Williams and others, says: "Just why it is that these organisms will attack the teeth of one individual and not another, or why the same individual is susceptible at one time and immune at another, when the same organisms may be demonstrated in his mouth, is at present not apparent. There is no doubt in my mind that the cause must lie in some condition of the oral fluids or the vital processes of the individual. In expressing this belief I do so despite the fact that I am familiar with the work of Miller in his chemical analysis of the saliva of susceptibles and immunes and finding no chemical difference, and his bacteriologic studies upon the same subject with the same findings. I am also familiar with his hypothesis of symbioses; but while this may explain the present status of the individual in regard to caries, it pushes the problem a little farther back, for we may ask the question: Why do the non-pathogenic bacteria predominate at times of immunity and the pathogenic at times of susceptibility? To my mind the only answer *must be in some yet undiscovered substance in the saliva of some form of vital resistance.*" [Italics ours.]

Dr. C. N. Johnson evidently is of the opinion that Miller's explanation of caries does not fully cover all conditions which clinically present in daily practice, for in the September, 1907, issue of the *Dental Summary* he states:

"What we particularly need further light upon, in connection with this disease, is a better understanding of the conditions which influence the progress or retardation of caries. We need to know why some mouths are practically immune from this affection

while others are peculiarly susceptible to it, and also to know why it is that in the same mouth there are periods when the disease progresses very rapidly and others when it is apparently in almost total abeyance. It has seemed difficult to get the profession generally to recognize the clinical manifestations of these varying conditions, though they are unmistakably evident to a close observer; and up to this time it has seemed equally difficult to those who have observed them to suggest any plausible theory to account for them. There must be certain unrecognized elements in the mouth, tending to influence the conditions of immunity and susceptibility, and it remains for future scientific investigations to determine what they are and point them out to the profession."

Every experienced practitioner has observed a rapid decay—teeth virtually melting away—in the mouths of young women of foreign birth who have recently emigrated to the United States, and who gave a history of almost perfect teeth, so far as caries is concerned, upon their arrival. This same condition is observed almost universally in the mouths of American women during and immediately following the gestation period. Some years ago the writer lanced the gum tissue in the mouth of a young man, 18 years of age, and extracted an unerupted lower third molar that showed a typical specimen of caries of both enamel and dentin. Other cases of this kind have been reported. It is quite common to find, especially in the mouths of middle-aged men, carious teeth, which have remained dormant for years, and the processes of decay again becoming active when the patient is subjected to worry or some other strain upon the nervous system.

It seems, therefore, that the profession has simply been forced to the alternative of accepting an explanation which does not fully explain, or frankly admitting that there is much concerning the true etiology of dental caries which with our present light upon the subject we do not understand.

In this issue of the DIGEST, page 1103, we are pleased to publish the results of a series of experiments conducted by Hugh H. Wightman, Ph.G., M.D., to which the reader's attention is especially directed. Dr. Wightman advances a new theory on the etiology of dental caries and has furnished food for serious

thought. Let us hope that the line of research work herein suggested will be taken up by our scientific investigators and carried to a fuller fruition.—J. P. B.

Notices.

ANNOUNCEMENT.

With this issue the name of Dr. J. P. Buckley appears on the cover of the DENTAL DIGEST as its editor. Dr. Buckley has been editing the journal for the past three months and, having decided to accept the position permanently, will now have full charge of the editorial direction of the publication. All correspondence pertaining to the editorial department should be addressed

DR. J. P. BUCKLEY, 163 State Street, Chicago.

TEXAS STATE BOARD OF DENTAL EXAMINERS.

The Texas State Board of Dental Examiners will hold the next semi-annual examination at Waco, Tex., Dec. 16, 1907. For further information address the secretary, DR. BUSH JONES, Dallas, Tex.

NORTHEASTERN IOWA DENTAL ASSOCIATION.

The Northeastern Iowa Dental Association was organized at Dubuque, Sept. 16, 1907, and the following officers elected: President, H. L. Hanks, Dubuque; Vice-President, F. W. Conover, Decorah; Secretary, W. L. Mullen, Dubuque; Treasurer, C. H. Jacobs, Colesburg.

CENTRAL ILLINOIS DENTAL ASSOCIATION.

At the annual meeting of the Central Illinois Dental Association, held at Litchfield Sept. 17, 1907, the following officers were elected: President, C. H. West, Farina; Vice-President, W. M. Shaw, Taylorville; Secretary, B. F. Dowell, Pana; Treasurer, W. H. Houser, Taylorville; Librarian, O. G. Colby, Hillsboro.

NORTHERN INDIANA DENTAL ASSOCIATION.

The annual meeting of the Northern Indiana Dental Association was held at Peru Sept. 17 and 18, 1907, and the following officers were elected: President, L. J. Mason, Fort Wayne; Vice-President, T. A. Goodwin, Warsaw; Secretary, J. A. Dinwiddie, Lowell; Treasurer, W. R. Meeker, Peru; Supervisor, M. A. Payne, Wabash. The next meeting will be held at Fort Wayne.

NORTHERN IOWA DENTAL ASSOCIATION.

The annual meeting of the Northern Iowa Dental Association was held at Sioux City in September, 1907, and the following officers were elected: President, C. N. Booth, Cedar Rapids; Vice-President, H. P. White, Sioux City; Secretary, J. W. Kelley, Mason City; Treasurer, C. W. Crandall, Spencer.

FIRST DISTRICT DENTAL SOCIETY OF ILLINOIS.

The twenty-fourth annual meeting of the First District Dental Society of Illinois was held at Galesburg Sept. 24 and 25, 1907, and the following officers were elected: President, J. D. McMillan, Macomb; Vice-President, E. M. Robbins, Carthage; Secretary, H. W. McMillan, Roseville; Treasurer, J. M. Evey, Monmouth; Executive Committee, J. W. Marsh, Keokuk, and W. F. Whalen, Peoria; Supervisor of Clinics, C. A. Willits, Canton; Dental Art and Invention, W. E. Mabee, Galesburg. The next meeting will be held at Peoria.

DAVENPORT (IA.) DISTRICT DENTAL SOCIETY.

The Davenport District Dental Society was formed Sept. 31, 1907, and the following officers elected: President, F. B. James, Wilton Junction; Vice-President, C. R. McCandless, Davenport; Secretary, O. E. Greene, Clinton; Treasurer, J. T. Martin, Muscatine. The next meeting will be held at Davenport.

IOWA STATE BOARD OF DENTAL EXAMINERS.

The Iowa State Board of Dental Examiners will hold a meeting for examination at Iowa City, December 2, 3 and 4, 1907.

Written and practical examination will be required.

For further information address, E. D. BROWER, D. D. S., Secretary,
Le Mars, Iowa.

RED RIVER VALLEY DENTAL ASSOCIATION.

The annual meeting of the Red River Valley Dental Association was held at Crookston, Minn., Sept. 14, 1907, and the following officers were elected: President, Thomas Spence, Crookston; Vice-President, H. W. Whitcomb, Grand Forks, N. D.; Secretary, F. M. Wells, Grand Forks; Treasurer, C. L. Tompkins, Grand Forks. The next meeting will be held at Grand Forks.

KENTUCKY STATE BOARD OF DENTAL EXAMINERS.

The Kentucky State Board of Dental Examiners will meet for the examination of applicants at Louisville on the first Tuesday in December, 1907, at The Masonic, commencing at nine o'clock a. m. Applicants shall be examined in the following subjects: Anatomy, physiology, materia medica, pathology, histology, operative dentistry, oral surgery, chemistry, metallurgy, prosthetic dentistry, crown and bridge work, oral hygiene and dental prophylaxis.

Each applicant for examination shall be required to deposit with the secretary of the board his or her recent photograph, with signature on the reverse side, both of which shall be certified by the dean of his or her graduating college, or other persons acceptable to the board. Applicants must be graduates of reputable dental colleges.

Application for examination must be made upon blanks furnished by

the board, and must be accompanied by a fee of $20 and the above-mentioned photograph, all of which must be filed with the secretary ten days before the date of examination. For further information address

J. RICHARD WALLACE, Secretary, The Masonic, Louisville, Ky.

OHIO STATE BOARD OF DENTAL EXAMINERS.

The regular semiannual meeting of the Board of Dental Examiners of the State of Ohio will be held in Columbus, Nov. 26, 27 and 28, 1907. Only graduates are eligible for examination. Application, accompanied by fee, $20, should be filed with the secretary by November 16. For further information address H. C. BROWN, Secretary, 185 East State Street, Columbus, O.

INSTITUTE OF DENTAL PEDAGOGICS.

The next annual meeting of the Institute of Dental Pedagogics will convene in New Orleans, La., December 31, 1907, and January 1-2, 1908.

An exceptionally good program has been arranged by the Executive Committee. All dental college teachers are respectfully requested to attend. Full announcement of the completed program will appear in subsequent issues of this journal.

B. E. LISCHER, Secy.-Treas.,
504 Humboldt Bldg., St. Louis, Mo.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

At the last annual meeting of the National Association of Dental Examiners, held in Minneapolis, Minn., the following officers were elected for the ensuing year: President, Frank O. Hetrick, Ottawa, Kan.; Vice-Presidents, for the South, F. A. Shotwell, Rogersville, Tenn.; for the East, T. R. Henshaw, Middletown, Ind.; for the West, J. J. Wright, Milwaukee, Wis.; Secretary and Treasurer, Charles A. Meeker, Newark, N. J.

CHARLES A. MEEKER, Secretary.

RESOLUTIONS PASSED BY THE INTERSTATE DENTAL FRATERNITY.

At a joint meeting of the Interstate Dental Fraternities of New York and New Jersey, held in New York July 12, 1907, the following preamble and resolution were passed:

WHEREAS, it has pleased our Heavenly Father to call our friends, coworkers and founders of this Fraternity, Dr. John I. Hart, Dr. J. Bond Littig and Dr. Richard C. Brewster, from their earthly labors, which they so faithfully and conscientiously performed, to their eternal reward; and,

WHEREAS, they who were so faithful in friendship, generous in deeds, equitable and just to all men, kind and sympathetic in their natures, were wise counselors, whose high sense of honor and consistency at all times characterized their professional and private lives; therefore, be it

Resolved, that we, the members of the Interstate Dental Fraternities of New York and New Jersey, in session assembled, do record our deep sense

of the loss which the dental profession, and this fraternity in particular, has sustained; and be it further

Resolved, that we extend our heartfelt sympathy and sorrow to the bereaved families, and that these resolutions be spread upon our minutes and published in the dental journals, and that a copy be sent to the bereaved families.

F. C. WALKER, *Vice-President for New York.*
T. A. QUINLAN, *Secretary for New York.*
S. C. G. WATKINS, *Vice-President for New Jersey.*
FRANK G. GREGORY, *Secretary for New Jersey.*

OHIO STATE DENTAL SOCIETY.

The forty-second annual meeting of the Ohio State Dental Society will be held in the assembly rooms of the Great Southern Hotel, Columbus, Dec. 3, 4 and 5, 1907. An excellent program of papers, clinics and exhibits has been provided.

The educational feature of such a gathering can be appreciated only by those who are in regular attendance at this and other leading societies, and every ethical dentist in the state should come and, if not already a member, should join. Should you wish to stop at the Great Southern Hotel it would be well to have your rooms reserved in advance, as there are never accomodations for all; however, other first-class hotels are in the immediate vicinity. Mark the dates off now and prepare to come on the first day and remain through the entire session.

F. R. CHAPMAN, Secretary, Columbus, O.

INTERNATIONAL ASSOCIATION OF STOMATOLOGY.

The organization of the International Association of Stomatology, which took place at Paris, August 6 and 7, at the time of the First French Congress of Stomatology, was very successfully consummated. The proceedings of this important session will be published later. We can only give at this time the officers and consulting committee, composed of a member from each country represented.

OFFICERS.

Honorary Presidents	Dr. Eugene S. Talbot, Chicago, U. S. A.
	Dr. L. Cruet, Paris, France.
President and Vice-Presidents	Prof. Jos. von Arkovy, Budapest, Hungary.
	Prof. C. Redard, Geneva, Switzerland.
	Prof. C. Platschick, Milan, Italy.
	Dr. Otto Zsigmondy, Vienna, Austria.
	Dr. Johan Rygge, Christiania, Norway.
Secretary-General	Dr. H. Allaeys, Antwerp, Belgium.
Secretaries	Dr. J. Sim Wallace, London, England.
	Dr. J. Breitbach, Dresden, Germany.
	Dr. D. Nicolescu, Roumania.
Treasurer	Dr. F. A. Meyer, Amsterdam, Holland.

CONSULTING COMMITTEE.

Germany	Dr. Muller, Mittweisa-Dresde.
England	Dr. Anderson, Glasgow.
Austria	Dr. J. Wachsmann, Prague.
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Norway	Dr. J. Brun, Christiania.
Portugal	Dr. Manuel Caroca, Lisbon.
Roumania	Dr. Paul Marcovici, Bucharest.
Russia	Dr. Max Eliasstamm, Kieff.
Servia	Dr. Milos C. Popovic, Belgrade.
Sweden	Prof. Otto Ulmgren, Stockholm.
Switzerland	Dr. Berg, Chaux-de-fonds.

The next meeting will take place at Budapest, Hungary, in August, 1909, at the time of the XVI International Medical Congress, the latter to have a Section on Stomatology open to all medical graduates.

LATEST DENTAL PATENTS.

861,270. Pneumatic dental cement injector, Henry L. Cruttenden, Northfield, Minn.
861,356. Mouth wedge, Robert Buchfeld, Elberfeld, Germany.
861,598. Waxless flask, Isidor S. Moscovitz, New York.
861,874. Dentimeter, Reuben H. Macy, West Palm Beach, Fla.
862,588. Dental pliers, Lloyd E. Rowley, Jewell, Kan.
862,694. Dental separator, Rufus L. Anderson, Plant City, Fla.
862,780. Dentists' cabinet, Wm. H. Woods, Jasper, Mo.
862,881. Dental appliance, Calvin S. Case, Chicago, Ill.
863,006. Handpiece for dental engines, Jeffrey H. Springle, Montreal, Can.
863,478. Dental engine, Wallace W. Williamson, Syracuse, N. Y.
863,527. Tooth fastener, Frank Fritz, Alexandria, Minn.

News Summary.

W. J. PRATHER, a dentist of Fresno, Cal., died in that city Sept. 8, 1907.

CIVILIAN FONES, 71 years old, a well-known dentist and a former mayor of Bridgeport, Conn., died from heart disease Sept. 21, 1907.

CYRUS A. GREGG, a prominent dentist of Pueblo, Colo., died Sept. 26, 1907.

L. GREENE, 27 years old, a dentist of Springfield, Ky., died from paralysis Sept. 13, 1907.

MARTIN M. VIET, a prominent dentist of New Orleans, died, after a long illness, Sept. 18, 1907.

FRANCIS D. COLEMAN, a dentist of Portland, Me., died from Bright's disease Sept. 7, 1907.

JOHN W. FIELDEN, a well-known dentist of Fall River, Mass., died Sept. 13, 1907.

H. C. SMITH, a dentist of Springfield, Mo., died from stomach trouble Sept. 16, 1907.

JOHN TIFFIN, 38 years old, a dentist of St. Louis, Mo., died from consumption Sept. 15, 1907.

H. A. IRWIN, 60 years old, a dentist of Zanesville, O., died from Bright's disease Sept. 10, 1907.

WILBUR M. PIERCE, a well-known dentist of Bristol, Pa., died from tuberculosis Sept. 24, 1907.

HARRY B. CAMPBELL, a popular young dentist of Bridgeton, Pa., died from typhoid fever Sept. 20, 1907.

EUGENE PALMER, 55 years old, for more than thirty years a dentist of New York City, died early in October, 1907.

W. J. MARSH, 45 years old, a dentist of Downieville, Cal., died from pneumonia Sept. 30, 1907.

JOHN MARTIN SAUCERMAN, 41 years old, a well-known dentist of Freeport, Ill., died from a complication of diseases Oct. 5, 1907.

MARION LEGALLEY, 35 years old, a dentist of Peru, Ind., died at Bowling Green, O., Oct. 7, 1907.

E. L. SARGENT, 76 years old, one of the oldest dentists in Watertown, N. Y., died Sept. 29, 1907.

E. J. GOODMAN, at one time a prominent dentist of San Antonio, Tex., was found dead in his room at a hotel in Devine, Tex., Oct. 5, 1907.

CHARLES HARRY KING, 41 years old, a dentist of Amherst, Wis., died Sept. 25, 1907.

FRANCIS A. RAMSAY, 76 years old, in practice for more than fifty years at Norristown, Pa., died Sept. 29, 1907.

JOHN VALLERCHAMP, 70 years old, a well-known dentist of Harrisburg, and the oldest Mason in Pennsylvania, died at Bloomsburg, Oct. 8, 1907.

SAMUEL L. GOLDSMITH, a well-known dentist of New York City, secretary of the New York State Dental Society, died from heart disease at St. Paul Sept. 25, 1907.

E. H. COOLBAUGH, 56 years old, a prominent Kingston, N. Y., dentist, was found dead by a searching party Oct. 1, 1907. He had gone on a hunting trip and was suddenly stricken with heart failure.

LESS CONSIDERATE.—"Teeth," groaned the man with the aching molar, "are like money." "What's the answer?" queried the drug clerk. "Hard to get, hard to keep and hard to lose," answered the sufferer.

BANKRUPT.—Herbert Sylvester, a dentist of Wilkinsburg, Pa., filed a petition in bankruptcy in the United States District Court Oct. 7. His liabilities are given at $1,023.10 and assets at $433.25.

ACCIDENTS.—Dr. A. Walker, a dentist of Athens, Ga., was thrown from a carriage while driving Sept. 25, resulting in the breaking of his right leg and bruising of his body.

FATHERLY ADVICE.—My son, as long as you want to be a specialist, then be a dentist instead of an ear doctor; people have only two ears, but they have thirty-two teeth.

PUT IN AN INLAY.—Dr. Kirk is quoted as saying, "If a tooth is worth a dam, put it on." Very good advice at the time it was given, but when my dentist tells me one of my teeth is worth a dam, I say, "Put in an inlay!".—DR. C. S. VANHORN, *Dental Cosmos.*

ASKS $10,000 FOR BROKEN JAW.—Helen G. Phillips of Chicago began suit Sept. 13 for $10,000 damages for injuries received at the hands of a dentist of that city. She charges the dentist with being careless to such a degree that he broke her jaw in extracting a wisdom tooth.

MORE ROOM FOR DENTAL COLLEGE.—Plans for providing the crowded Dental College of the University of Minnesota with more space are gradually being worked out and put into operation. President Cyrus Northrup, after a conference with Dean Westbrook of the medical department and Dean Owre of the dental department, said: "All of the students who are here to register for the course in dentistry will be accommodated."

LEPER HAS TOOTHACHE.—Harrisburg's (Pa.) leper, Mock Sem, came to the front again last evening (Sept. 28), when a telephone message was received from the municipal hospital that the expensive patient had the toothache. Now the harassed city authorities are hunting a dentist to go out and extract the molar. The State Health Department was applied to, but it does not have dentists on its staff, and it was up to the city authorities to take care of his teeth. Meanwhile the county authorities are feeding him.

ILLEGAL PRACTITIONERS.—A young woman detective for the New York State Dental Society has had three dentists of Utica arrested for practicing without licenses. Examinations adjourned until Oct. 17.—In the cases of two dentists of Winnipeg, Man., arrested for practicing without licenses, one was dismissed for lack of sufficient evidence, and the other remanded for a week, at the request of the prosecution.—Two dentists of Oakland, Cal., one a native-born Chinese, have been arrested for practicing without a license. Both were released on $50 bail on each charge.—The cases against two dentists of Danville, Ill., brothers, defendants in three suits on charges of practicing illegally, have been continued until January.—A dentist of Butte, Mont., who was prosecuted for practicing dentistry illegally, has brought suit for $2,000 damages, on the ground of illegal arrest and imprisonment.—A barber of

Chicago was arrested Sept. 4 on a charge of practicing without a state license. He learned both trades in Germany.—A dentist of Los Angeles, Cal., was arrested Sept. 27 for practicing without a license. The next day he forfeited his bail, amounting to $50, by not appearing for trial.

KIND TO RICH MAN.—According to newspaper report, Elmer A. Hunter, a dentist of Kansas City, Mo., will receive practically the entire estate of Charles E. Rohman, a retired money lender, according to Rohman's last will, filed Sept. 16. Hunter two years ago picked Rohman up from the floor of a hotel when he fell from a stroke of paralysis and was his nurse and best friend to the time of his death. The estate is estimated to be worth between $35,000 and $50,000.

ESTIMATES.—Teach the people that you expect a monthly settlement, and see that the bill is rendered promptly on the first of the month. An estimate of the work to be done is one of the best roads to large fees. Tell the patient frankly what the work will cost. Make a chart of the work to be done, and a little practice will teach you to rate yourself and the work. Make the estimate large enough to cover any extra work that may be discovered while you are operating. Never exceed your estimate; rather have it less; the patient is better pleased.—H. E. HOLSEY, *Items of Interest.*

MORTALITY RATE OF NITROUS OXID.—In carefully searching the literature on the subject, the estimated mortality in this country and in Europe is about 1 in 150,000 cases. Estimating from my own experience and the experience of some of my friends, who have used the agent very extensively, I would say the rate was a great deal lower; at least 1 in 250,000 or even 1 in 300,000. It is a question whether the cause of death in the cases reported is directly referable to the use of nitrous oxid. Properly administered, I consider the agent absolutely safe—the safest of all general anesthetics.—F. B. MOOREHEAD, *American Dental Journal.*

ON THE MODERN STEAMSHIP.—An enterprising French dentist who practiced his art on board the S. S. "La Savoie," which arrived in New York Sept. 7, found plenty of clients. Why not? The modern steamship with a thousand well-to-do passengers should be as much in need of a dentist as a big hotel. Indeed, it should afford greater opportunities to a skillful practitioner, because, aside from the casual troubles with teeth that occur, there are always on board busy men who have no time for protracted sittings when ashore. The big modern liner is now equipped with everything except billiard tables, and some genius may yet contrive to make even them practicable at sea.

FATALITIES.—A young man of Wyandotte, Mich., died Sept. 24 as the result of the breaking of an abscess that had formed after he had a tooth extracted last spring.—A lumberman of Bessmay, Tex., died Sept. 24 in a dentist's chair, while under the influence of chloroform, after having had twenty-two teeth extracted.—A man in Weatherford, Tex., dropped dead in a dentist's office at the first contact of an instrument with an aching tooth. He had been in poor health for some time.—A woman from Washington

township, Ind., died Sept. 21, in the office of a dentist at Logansport, from strangulation while under the influence of chloroform. Twenty-one teeth had been extracted.—A man of Allegheny, Pa., died Sept. 17, in the office of a dentist at Pittsburg, while under the influence of an anesthetic for operation on an abscess of the jaw, resulting from the extraction of a tooth some months previous.

SALVE FOR JAW.—Gertrude S. Partos of Los Angeles, Cal., was given judgment for $147 in her suit for damages against the Yale Dental Company and J. A. Foster, head of the concern. In her action, which came to trial in the Township Justice Court two weeks ago, and was taken under advisement by Justice Selph, the plaintiff declared that Foster is not a dentist, but hires young men with diplomas to work for him. Two of these young men, designated as "John Doe and Richard Roe" in the complaint, were said to have broken the crown off one of the plaintiff's teeth which they were working on, injuring her jaw so seriously that she was prevented from attending to her household duties for three weeks.

MEN EXCEPTIONAL WHO CAN LAY SOLE CLAIM TO ANY GREAT THOUGHT OR INVENTION.—Dr. Reoch has said that it often happens that scientific minds, working independently of each other, may simultaneously startle the world with some great discovery. Indeed, this so often happens that the man is exceptional who can lay sole claim to any great thought or invention. The spirit of discovery is inherent in man's nature. It goes hand in hand with progress, and as man's needs increase it keeps pace. What wonder is it then that two men, with a common interest in solving complicated problems, should arrive at the same conclusions, at about the same time, and without any previous exchange of ideas.—DR. STANLEY, *Items of Interest.*

CRUSADE AGAINST MEDICINE FAKERS.—With the arrest of "Dr. Bosworth" yesterday the state authorities are said to have started a campaign against medicine fakers.. The so-called "doctor" has been holding meetings on the North Side and has been selling "Arabian Water Salts." He must appear in court next Saturday and explain by what right he has peddled patent medicines. "Dr. Petit" of the "White Sulphur" medicine staff, with headquarters at the Palace Hotel, also has been summoned to appear in the Municipal Court. According to Charles G. Hoffman, attorney for the State Board of Health, medicine fakers now swarm in Chicago. In order to do business they must first have a license from the state.—*Chicago Record-Herald.*

ETIOLOGY OF PYORRHEA—CONSTITUTIONAL OR LOCAL?—Those who believe pyorrhea to be of purely local origin seem to think the argument that the disease does not continue after the extraction of the tooth or teeth establishes their position beyond the shadow of a doubt. But does the disease cease with the extraction? Those of us who have had wide experience in prosthesis, particularly in full dentures, know that in constructing a denture for a patient who has lost his teeth from pyorrhea we may expect a continued and rapid absorption of the process until it is completely gone, a much more rapid process than in cases where pyorrhea did not exist. It is my

opinion that the same causes that made for the destruction of the gum and alveolar tissue before extraction continue in operation afterward, of course, not so violently, because the teeth are not in position to afford a lodging place for the serumal deposits and the consequent local irritation, but the destruction of the process goes on after extraction and is, to my mind, the strongest argument in favor of making a most heroic effort to cure pyorrhea. —Dr. A. J. Cottrell, *Dental Brief.*

Specific Action of Colors.—As to the specific action of the various colored lights, there is much that is worthy of note. In the sun's rays are found the three elements—luminous, caloric, and chemical or actinic—represented by the amber, red, and blue rays, respectively. The amber possesses power to decompose carbonic acid; the red stimulates, causing the various stages of excitement, irritability, etc.; the blue or violet ray promotes assimilation, induces calmness, contentment, and relaxation, but most important of all it has the power of penetrating the tissues of the body and destroying the microbes, thus being of special value in case of deep dental abscess, or other mucous or sub-mucous inflammation.—Dr. W. J. Hodson, *Dental Cosmos.*

Dentistry Is Not New.—It has recently been established by a German dentist named Galli that modern dentistry has few new wrinkles. He has discovered that the Etruscans were accomplished dentists. Numerous Etruscan skulls which he had examined show teeth that had been filled with great skill. He found four teeth that had been covered with gold capsules, two covering natural teeth, while the other two were artificial teeth—real bridge work, which has been thought to be an invention of modern dentistry. It is shown by these discoveries that the Etruscans were like ouselves—not a bit backward in showing their teeth covered with gold—and that the old dentists knew something about filling teeth is shown by these fillings, which have lasted about 2,300 years.

Mixing Porcelain.—In making the mix a misconception occurs which is fatal to the best results and the greatest density of porcelain, and that is to jar the body into place, as is usually done. When a mass of wet porcelain is jarred it causes air bubbles to settle toward the bottom of the mass, and the more it is jarred the larger are the bubbles. This may be proved by placing porcelain on the end of a spatula and jarring it. Then examine it with a glass and it will be found full of bubbles near the bottom. Porcelain should be gently pressed or wiped into place with a spatula in such a manner as to constitute a burnishing of the porcelain. When built up in this way it is very dense and strong, and little shrinkage is caused by fusing.—Louis Ladewich, *Dental Review.*

Barton (Vt.) Dentist Has Novel Appliance.—Dr. J. A. Pearson, a dentist of Barton, has completed an appliance which is attached to the steam gauge of his vulcanizer, a novel and useful arrangement. When the indicator shows a certain degree of pressure a bell is rung. The appliance is a simple one and may be attached to any steam or other gauge. Two small metal pieces are attached to the dial of the indicator at such point as desired,

opposite each other, and when one end of the indicator is forced to the point of one metal piece the other end touches the opposite piece of metal, which forms a circuit of electricity from storage batteries to an electric bell, thus giving the alarm. The principle is simple, but, as far as known, nothing of the kind is in use. With a little ingenuity the appliance may be attached to any indicator, and the expense is very small.

DENTISTS ARE MECHANICS.—If the dentist would become better equipped theoretically and know the why and wherefore of what he does, the work would be more interesting and less mechanical. Dentists upon graduation, as a rule, are mechanics. Where one becomes more or less proficient in therapeutics, chemistry, surgery, etc., it is apt to be acquired later. How one can expect a young man to become learned in theory at the same time he is making his first gold filling, plate, or treating an abscess is a mystery. If he is any good at all, some branch is bound to suffer, and the more proficient he becomes in one the less he is apt to excel in the others; and at the same time he is apt to be a better and greater man than the one who can accomplish all rather indifferently.—DR. F. A. DILLIE, *Dentist's Magazine.*

"ADJUSTING A LOGAN CROWN."—Stump of the root is ground to its proper place; select proper tooth, proper shade; grind away the palatal portion. Fit platinum disk thirty-eight gauge to end of root; punch hole in the disk with a mandrel, same shape as pin of Logan crown. Readjust the disk until the fit is perfect and force the pin through the disk until in its proper place; the disk will be held upon the pin with sufficient firmness and the body is then placed in the V-shaped space between the disk and the ground palatal surface of the crown. When the bakings are completed, with the proper contour, the platinum is removed.

In this method we retain the complete strength of the Logan crown, also the beauty, and have an absolutely perfect joint. No investment and soldering.—DR. J. D. PATTERSON, *Western Dental Journal.*

SINUS—NOT FISTULA.—The definition of the word "fistula" in different dictionaries varies a little. There is no misunderstanding over the word sinus in all the dictionaries. Sinus is the name applied to a tract that carries pus. That is plainly stated in all dictionaries and encyclopedias. In those same books a fistula is stated as an abnormal tract which carries fluid; and in going over all those very carefully you will find that the preference is given mostly to the use of that word to describe an abnormal tract which carries a normal fluid. So, to my mind, the word fistula should be applied to an abnormal tract which carries some one of the normal secretions of the body; such as a salivary fistula, if we have an opening through the chin so that the saliva passes through, or a urinary fistula, if we have an abnormal opening, so the urine is discharged through that; and so with the different secretions of the body. There is no question but what "sinus" is absolutely the proper term to use in connection with such tracts. There may be some slight justification, as I have said, in the distinction of some dictionaries,

for the use of the word fistula as applied there; but certainly the preference is given to the other. We can improve our nomenclature by using the word sinus when referring to a tract that carries pus, and fistula to the other.—Dr. A. D. Black, *Dental Review.*

Inserting Gold Fillings Into a Cemented Matrix.—In the February, 1907, *Cosmos* W. Thompson Madin of Birmingham, England, gives a method of using cement under gold fillings that seems to solve the problem very nicely, and it places the gold filling ahead of the inlay as a tooth saver, according to the ideas advanced by the inlay advocates. His method is to prepare the cavity as for a gold filling and cover the walls with cement as for an inlay. Into this he forces No. 30 gold foil as if for a matrix for an inlay. The filling is then inserted into this matrix in the usual manner. This gives a practical and expeditious method of using cement under gold fillings. I have inserted a number of fillings after this method, trying to make the line of cement around the gold as slight as possible, and I find the originator's claim of invisibility is correct.—E. A. Royce, *Dental Review.*

Robberies.—Burglars entered the office of A. L. Harter of Kokomo, Ind., on Sept. 15 and stole gold foil and plate amounting to $25.—Sept. 17 Dr. W. Z. King of Elwood, Ind., was relieved of gold and unfinished work valued at $85.—An unknown miscreant crawled through the transom of Dr. G. I. Drucker's office in Tonopah, Nev., Sept. 15 and rifled his desk of gold and dental supplies worth about $15.—The offices of Drs. H. C. King and R. F. Phillips, also of Tonopah, were entered Sept. 16 and materials and unfinished work valued at $100 taken.—Sept. 11 gold valued at $35 was stolen from the office of Dr. W. W. Wallace of Mansfield, O.—Dr. Henry Oldham of Springfield, O., lost gold plate valued at $12 recently.—Oct. 3 the offices of Drs. T. S. Smith, H. C. Reynolds and C. S. McGowen of Berkeley, Cal., were entered, and gold and platinum amounting to $60 was taken.—Oct. 8 Dr. C. C. Sherwood's office in Ottawa, O., was entered and about $100 worth of gold taken.

Treatment of Abscessed Deciduous Teeth.—It seems necessary to preserve the deciduous teeth until the permanent teeth erupt, even though the pulps are dead and in a putrescent condition. I will tell you how I treat those little teeth, although it may not be anything new. I do not want to extract them, one reason being that I do not want to hurt the little patient. The best thing to do is to treat the abscess. First getting the confidence of the little patient, take a bur and make an opening into the pulp chamber. Then place a pledget of cotton into the opening. On a slab mix precipitated calcium phosphate and the formo-cresol remedy into a good stiff paste. On the other end of the slab have the cement all ready. Then take the cotton out of the cavity and with warm essential oil water thoroughly wash out the cavity. Now dry the cavity and keep it as dry as possible. Then put in the paste, pack it down gently into pulp chamber and cover it over with cement. If I want that tooth to last for two years or three, I can have my patient come back, or even at the same sitting, I can remove the surplus cement

and put in an amalgam filling. It does not make any difference how much pus there is around those roots, if you see the patient the next day, the abscess will be healing and it will remain healed providing, of course, there be no bone complication.—Dr. J. P. Buckley, *Dental Review.*

Dentistry of Long Ago: Proof That Ancients Had Some Degree of Skill in Art.—While unthoughtful moderns regard dentistry as being virtually a science of our own age, archeologists know that it was practiced among the ancients. The museums of Rome and other places in Italy possess various specimens of dentists' work dating from before Christ, and another such specimen has recently been discovered in the jaws of a skeleton found in a tomb at Teano. The skeleton is that of a woman, and from the jaws there was extracted a gold mount containing six teeth. A peculiar fact about the find is that the teeth, although "flapped" with gold, were undoubtedly natural, and the theory is that the ancients used gold flaps or rims to steady loose teeth. For artificial teeth the dentists of the old world had a fancy for animal teeth, especially bovine, by reason of their hardness, though occasionally a person in poverty would sell one for sufficient compensation.

Two Divisions in Dentistry in Austria.—The practice of dentistry in Austria is divided among two sharply defined classes—the so-called "Zahnarzte" and the "Zahntechniker." The latter are only permitted to work on artificial teeth and the various appliances used in dental work. They are not allowed to perform operations of whatever character upon the patient nor to actually insert artificial teeth or any apparatus whatsoever. All work upon the patient must be performed by the "Zahnarzte," who are regularly graduated doctors of medicine and who have subsequently pursued a special course in dental surgery. A foreign dentist, therefore, wishing to practice his profession in Austria would be obliged to fulfill the same requirements as for the practice of medicine. It is, however, recognized in Austria that American methods in dentistry are the best in the world, and very many students go to the United States and enter institutions there in order to perfect themselves, usually after having secured their M. D. degree in an Austrian university.

Porcelain Paved the Way.—If to-day porcelain had been eradicated as a filling material, it would have left as a colossal memento the demonstrated and potent fact that the inlay process stands without a rival as a humanitarian method of restoring carious or broken-down teeth to a condition permitting the performance of their normal functions. But porcelain has not been eradicated, nor will its obsequies be in order until such time as something better comes to take its place.

I am not here to defend porcelain, for when we consider that the inception of its use as an inlay material, even as inlays are inserted to-day, dates back some twenty-seven years, with the demand for its use steadily increasing, I think all will agree that encomiums at this late date would be superfluous.

But I am here to maintain the inlay principle; to assert that it is not only a humanitarian method of conserving the human teeth, but it is a means by

which much temporary work, many amalgam restorations, and many crowns may be eliminated; and to affirm that the operator who is not recognizing the important relation that inlay processes bear to the operative dentistry of to-day is neither maintaining a standard in keeping with the high standing that our profession has justly earned, nor is he giving to his patients that which is their due.—DR. C. S. VANHORN, *Dental Cosmos.*

MARRIAGES.—C. H. Hammond, a dentist of Lawton, Okla., was married to Miss Caro M. Millen of Marion, Ia., Sept. 17.—Vernon J. Jarrett, a dentist of Omaha, Neb., was married to Miss Claire A. Pugh, a dentist of Des Moines, Ia., Sept. 11.—Walter N. Brown, a dentist of Newsburyport, Mass., was married to Miss Charlotte F. Anderson of Lynn Aug. 18.—R. T. Case, a dentist of La Crosse, Wis., was married to Miss Iva B. Probete of Port Huron, Mich., Sept. 20.—J. C. Murdoch, a dentist of Peoria, Ill., was married to Miss Eva Major of Decatur in August.—Earl S. Addison, a dentist of Armour, S. D., was married to Miss Blanche V. James of Watertown Aug. 29.—P. H. Plummer, a dentist of Rockford, Ill., was married to Miss Katherine Daugherty of the same place Sept. 25.—Charles A. Weston, a dentist of Springfield, Mass., was married to Miss Helen M. Gerrish of Lowell Oct. 9.—J. M. Damron, a dentist of Elsberry, Mo., was married to Miss Melissa Melts of Humansville Sept. 19.—T. K. Hayward, a dentist of Washington, N. J., was married to Miss Elizabeth Doty of Paterson Oct. 11.—W. B. Gerow, a dentist of Glenville, O., was married to Mrs. Jennie Daugherty, also of Glenville, Sept. 25.

EXAMINING BOARD AFFAIRS.—Dr. Monroe Griswold of Hartford, Conn., has been appointed a member of the dental commission, in place of Dr. Edward Prentice of Stonington, who has declined to serve. The appointment is for the term which expires July 1, 1911.—A meeting of the new State Dental Commission of Connecticut, for organization, was held at Hartford Sept. 14. Dr. Fred W. Brown of New Haven was appointed for a term of five years; Dr. Monroe Griswold of Hartford, for a term of four years; Dr. H. G. Provost of Winsted, three years; Dr. D. Everett Taylor of Willimantic, two years; Dr. A. B. Johnson of New Britain, one year. The semi-annual examination of candidates for license to practice dentistry will be held on November 7, 8 and 9. It was voted that oral hygiene and dental prophylaxis be added to the list of subjects upon which candidates will be examined. The new section twelve of the dental law requires all unlicensed assistants who were performing independent dental operations on or before January 1, 1907, to register with the recorder on or before Oct. 1. The age to be required of candidates for registration was considered and will probably be fixed at not under 21 years, the same as required of candidates for license. This matter will be referred to the attorney general.—Governor Stuart of Pennsylvania has reappointed Howard E. Roberts, Philadelphia, and H. W. Arthur, Allegheny, members of the State Dental Board.—By the requirement of a new state law in Utah, dentists are compelled to transfer the filing of their certificates from the recorder's office to the county clerk's office. Deferment of this action until after Oct. 19 will cost each dentist $25 to get his certificate

renewed.—The State Board of Dental Examiners of Michigan held its first session under the new law Oct. 8. The members are: President, C. H. Oakman, Detroit; Secretary and Treasurer, E. A. Honey, Kalamazoo; A. L. Legro, Detroit; A. W. Haidle, Negaunee; A. B. Robinson, Grand Rapids. Registration of dentists under the new Murray law is being conducted. The statute provides that all practicing dentists must be registered with county clerks and fixes a standard of education and practice which is requisite for the registration. The law was bitterly fought at the time it was passed, as being a measure aimed at the dentistry establishments where beginners in dentistry do the work under the supervision of a dentist of good standing. The dentists' association of the state, however, pushed the measure through. The three-year course at the University of Michigan, or its equivalent in some recognized school, is now required for registration, and a fee of fifty cents must be paid to the county clerk annually.—The Governor of California has appointed H. R. Harbison of San Diego and D. Maurice Crow of Los Angeles to the State Board of Dental Examiners, to succeed E. G. Howard of Los Angeles and G. A. White of Santa Barbara.

Cannot Inspect in Schools: Board of Education's Attorney Rules Against Physicians.—Physicians and dentists, under the law, have no right to enter the public schools of Kansas City, Mo., for a general inspection of the health of the students, according to an opinion given by Sanford B. Ladd, counseler for the board of education. In response to an inquiry from President Joseph L. Norman of the board, the attorney investigated the legal aspect of the matter and gave it as his opinion that the annual inspections of school children at the beginning of each school year have no legal foundation. "I had a conference with Dr. Eugene Carbaugh of the board of health over this question," said Mr. Ladd, "and he stated that, while the inspections had been made for several years past, he was satisfied that they must be discontinued. Marked objections to the plan have come from parents of some of the children, and in view of that fact the board will have to abandon the custom. Of course, in the case of contagious and infectious diseases it is altogether another story."

Soap and Tooth-Brush.—A committee of the National Association for the Improvement of the Poor has been conducting an investigation into the condition of the school children of New York and has come to the conclusion that what is needed in the public schools is more hygiene and less physical culture and gymnastics. The report of the committee makes some interesting disclosures. It was found that out of 600,000 children 485,000 are defective in some respect. More than 72 per cent. of all children examined had defective teeth, the committee discovering surprising negligence in consulting the dentist in the case of school children. Bad teeth are responsible for malnutrition, and many of the physical defects are attributed to this cause. It was also found that a very large number of children were total strangers to soap and the tooth-brush. This was true not only in the family of the very poor but in those of earners of good wages. The Association purposes to bring the matter to the President's attention and ask him to interest the

Bureau of Education of the Department of the Interior in the subject, hoping thus to get school superintendents throughout the country to begin a crusade on behalf of "the tooth-brush and a cake of soap."

A SATISFACTORY LOCAL ANESTHETIC.—The following formula has been used in my office, as a local anesthetic for the extraction of teeth and other operations within the oral cavity, for the last four years, and as yet we have to hear of any disagreeable results attending its use:

℞ Cocainae hydrochloridi.....gr xviii
Strychninae sulphatis .....gr ¼
Acidi borici .....gr xl
Phenolis .....m ii
Aquae destillatae .....f ℥ iv
M. Sig. Inject from 10 to 15 minims.

The gum should be rendered as aseptic as possible before being injected, and the syringe when not in use should be kept in the following solution:

Lysol, 5 per cent.....2 parts
Phenol, 5 per cent.....2 parts
Sodium bicarbonate, saturated sol. of.....1 part

After standing in this solution, the syringe should be carefully rinsed out with hot water before using.—DR. ROBERT WAKEFIELD.

A BANDLESS RICHMOND CROWN.—There are a great many ways of constructing porcelain-faced crowns, but in the normal or average occlusion the bandless Richmond, as we shall try to describe, will be found to be very satisfactory.

Right here we might say that, by the use of porcelain in our crown work, nature has been nearer approached than by any other means.

In the construction of this crown the tooth is prepared as for a Richmond crown. Cut a piece of pure gold about forty-gauge or heavier, that you think will cover the root with a margin all the way around, and leave a good length at lingual part. Burnish this piece over the root slightly and remove; then cut a hole a little smaller than the pin for same to pass through, replace your gold, and after selecting a suitable pin run same through the gold into root as far as is necessary.

Remove the gold with pin and solder with 20-k. solder, replace the pin and gold, which is now in one piece, being sure to leave the pin extending out of root and gold, so when the impression is taken the pin will have something to hold to. After replacing the pin and gold, hold the pin firmly in the root, and with a flat or suitable instrument burnish the gold well on root until you can see the root margins on the gold.

Remove and trim to where root margin is marked on gold except at lingual part; that is allowed to extend longer than the other part.

Now remove, and with the shears slit this long piece on lingual side into where you see the root margin marked on the gold at this part, replace and burnish, or turn this back well against the lingual portion of root, letting it extend into the free margin of gum against the root.

Having fitted this well against the root, we are ready to take the bite and impression. The pin and cap should readily come off with your impression. Make your cast with some investing compound and mount on articulator, select a suitable facing, and grind it to the root margin or where it shows in the gold on labial side, leaving the side of facing extending a little beyond the margins at sides of root.

Before grinding in your facing, the part of the pin that is protruding out can be cut or ground off. After your facing has been ground in as you want it, you are ready to wax it to invest. In waxing be sure to wax out to end of gold where it extends up on the lingual portion of root. You invest and solder as usual with 18-k. solder, letting it run well upon this lingual part. Having it soldered, you can now see just where to trim and polish to, the root margin showing on the gold very plainly.

When this is mounted it is sure to fit accurately to the root over which it is made, and you have practically as strong a crown as a Richmond, with no ill-fitting band extending into the gum to irritate and cause trouble that will result in the loss of the tooth sooner or later.

Platinum can be used in place of the gold, if preferred, as none of it shows.

I always use a Steele interchangeable tooth; in case of an accident it can be easily repaired. A crown constructed in this way should last a lifetime, everything else being equal.—J. C. LONGFELLOW, *Dental Summary.*

THE THERAPEUTIC SIGNIFICANCE OF THE SILVER SALTS.—In this important communication the author, after referring to the several organic and inorganic compounds of silver which may be successfully employed in general practice, states that of the soluble salts of this element collargol has the strongest antiseptic power. It comes in the form of small, easily breakable, black masses, having a metallic luster. It contains 87 per cent of pure silver and is soluble in twenty parts of distilled water, thus making it possible to prepare solutions up to 5 per cent in strength. It has been used with satisfactory results in the treatment of mixed infections such as diphtheria, tuberculosis, the remote manifestations of influenza, etc.

The internal use of collargol is especially indicated in cases of general infection, although it should be added that it is of little or no use in the case of the patient whose heart or vasomotor apparatus is in an exhausted condition, or where the infection is not present in the constituents of the blood, or in tissues not directly reached by the circulation. Credé, who has made a thorough study of this compound, has found that the free silver which becomes disengaged in the blood-current exercises strong bactericidal properties without inducing the slightest toxic effect, and that in addition it stimulates the phagocytic activity of the larger leucocytes. Its use is followed by no perceptible after-effects, and it has never been known to cause argyria, nephritis, or emboli.—DR. WILKIE, *Dental Cosmos.*